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Aims and Scope
The *Economic and Financial Review* is published four times a year in March, June, September and December by the Research Department of the Central Bank of Nigeria. The Review contains articles on research undertaken at the Bank, in particular, and Nigeria, in general, mainly on policy issues both at the macroeconomic and sectoral levels in the hope that the research would improve and enhance policy choices. Its main thrust is to promote studies and disseminate research findings, which could facilitate achievement of these objectives. Comments on or objective critiques of published articles are also featured in the review.

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The Contribution of Finance to Agricultural Production in Nigeria

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Abstract

Several studies have found a positive correlation between agricultural financing and the performance of the agricultural sector. But fewer efforts have been directed at sieving out the agricultural output that is exclusively associated with the extent of funding. This study aimed to ascertain the actual portion of total agricultural output that could be attributed to agricultural financing in Nigeria. The vector error correction methodology was applied following the nature of data properties. The results showed a positive effect of finance on agricultural output. However, variance decomposition revealed the poor state of agricultural financing with a disproportionate dependence of the sector on natural weather conditions. The case is therefore made for increased funding of agriculture for optimal performance.

Keywords: Agriculture, Finance, Food Security, Nigeria, Sustainable

JEL Classification: Q0, Q1, L6

I. Introduction

In many developing countries, trends in undernourishment are complicated by the nutrition transition, characterised by a shift away from traditional diets towards a more globalised intake pattern that include increased quantities of processed foods, animal products, sugars, fats and (sometimes) alcohol (Popkin and Gordom-Larsen, 2004). For many countries in the middle stages of nutrition transition, continued high rates of food insecurity and under nutrition, combined with increased prevalence of overweight and associated non-communicable diseases, are resulting in a "double burden" of malnutrition. There is real urgency among governments and multilateral agencies to boost food production and this is being pursued with different agricultural models, including the need to migrate to commercial farming in many developing countries.

Commercial agriculture had emerged as a principal factor that distinguished transition economies from the predominantly agrarian ones. Commercial agriculture involves considerable application of modern techniques, including machinery and other farm input. Such capital equipment significantly reduces the number of labour

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1 At the initial stages of commercialisation

per output – implying higher labour and capital productivity – although the extent of the incremental productivity would depend on whether the agricultural sector is in the sunrise or sunset stage of the application of capital, the incremental capital/output ratio being higher in the region of sunrise.

Finance is pivotal in the commercialisation of innovations. In agriculture, finance remains the bedrock for mechanisation – the purchase of machinery, the training to use machinery, the transportation of equipment and produce, the marketing of produce etc – so that it could be taken for granted the positive correlation between agricultural finance and actual agricultural production. Therefore, since the size of agricultural production theoretically a positive function of finance, the coefficient of association between finance and food security must also be positive. Agricultural production also depends on the vagaries of weather. Rainfall in the right volumes would boost output through aiding the decomposition of nutrients and providing fluidity. Sunshine is important for many reasons, including photosynthesis. These dependencies on weather do not diminish the importance of finance for modern farming. The rain would need to be harvested and supplied across the season and channeled appropriately in irrigation facilities and ditto sunshine. However, in economies dominated by traditional agriculture, output is essentially seasonal depending wholly on the clemency of weather and crude farm equipment.

The agricultural sector in Nigeria consists of a mix of modern production and the traditional techniques. The former are the organised enterprises like the Obasanjo farms in Ota, Presco in Edo state and among others, while the latter includes the small farm holdings scattered across the country. It is easy to ascertain how much input in finance that is utilised by the modern farms, but the same cannot be said of the small holdings as they depend mainly on weather conditions. However, available agricultural statistics do not separate the volume of output that is supported by finance from that accruing as a consequence of the effect of other factors. But such a separation would be important in many fronts.

Visibly, such a calculation will make it easier for policy makers to understand, in clear terms, the need to advocate for increased funding of agriculture for greater productivity of the sector. In addition, it would be possible to establish the exact numerical association between extent of financing and expected periodic output. For farmers seeking financial assistance from formal financial intermediaries, the result of this separation would make credit evaluation more transparent and therefore ease access to finance, among others. Therefore, the aim of this paper is to access the relative contribution of agricultural finance to total agricultural output in Nigeria. The

paper reviews the contribution of finance to agricultural production in Section II. Methodological issues are treated in III. Section IV presents econometric estimates, while Section V recommends and concludes.

II. Literature Review

Finance is a key component in every business endeavour required for the establishment and running of the business. It is the life blood of any business. Funds are required for the purchase of capital equipment such as land and building, machinery and other fixed assets as well as working capital. It is worthy of note that with growth in activities in any business, comes increased financial needs and increased access to funding would facilitate expansion. The agric-business involving primarily food production, distribution, processing, marketing is not an exception. Zhang (2007) suggested that deepening financial intermediation may promote economic growth by mobilising more investments, and lifting returns to financial resources, which raises productivity.

Agricultural finance is the acquisition and use of capital in agriculture. It deals basically with the supply of and the demand for funds in the agricultural sector of the economy. USAID (2010) defined rural agricultural finance to include all types of finance available to farmers. It is a field of work in which people aim to improve access to efficient sustainable financial services for the agricultural industry, including farming and all related enterprises. It involves all financial services, including savings, transfers, insurance and loans, input supply, processing, wholesaling and marketing (Meyer, 2011). IFAD (2010) further adds that agricultural finance refers to all those financial services that focus on on-farm activities and agricultural businesses without necessarily targeting poor people. The crucial role of financing in agriculture cannot be overemphasised. The escalating world population is associated with greater pressure on food demand and the demand for agro-products that are input for further production, thus the need for use of more sophisticated methods capable of yielding greater output is essential. Finance in agriculture is as important for improved productivity as technical input can only be purchased and used by farmers if they have required fund at their disposal.

In Africa, a significant proportion of the population live in the rural areas with agriculture as their major preoccupation and financial constraints in agriculture remain prevalent. Finance to the agricultural sector remains costly and inequitably distributed and this limits the ability of small-scale farmers to grow their productivity. According to Nyoro (2002), lack of working capital and low liquidity limit the farmer's ability to purchase productivity enhancing input like seeds, fertilisers and pesticide.

This was supported by Awudu and Huffman (2000) and Kimbaara (2005) stating that the average production efficiency levels are higher among producers who have access to formal credit.

Agricultural credit therefore enhances productivity and promotes standard of living by breaking the vicious cycle of poverty among farmers. Literature abounds on the relationship between agricultural finance and agricultural productivity. Zuberi (1989) asserted that agricultural output was low in developing countries. Using Pakistan as a reference, he attributed this to small holdings, traditional methods of farming, poor irrigation facilities, low or misuse of modern farm technology, among others. This resulted in small income and no saving or small saving. Access to finance therefore, was expected to stimulate farm investment, boosting the use of modern inputs, and augmenting farm production. Since farmers, especially in the rural areas were poor, they found it difficult to save, and funds available through informal financial markets were usually costly, while the commercial banks and other formal sources of funds view the sector as risky for lending. Also, low returns on investment and the long period of pay-back associated with agricultural activities, compared with other non-agricultural activities, limit formal lending. The perceived high risks and long-gestation period is mainly associated to the fact that the sector's output depends on the vagaries of weather.

Iqbal et al., (2003) in their study identified three main factors that contributed to agricultural growth as the increased use of agricultural input, technological change and technical efficiency. Technological change was the result of research and development efforts, while technical efficiency referred to the rate at which new technology was adopted and used more rationally and was affected by the flow of information, better infrastructure, and availability of funds and farmers' managerial capabilities. Higher use and better mix of input also required funds. These funds could come either from farmers' own savings or through borrowings. In less developed countries where savings were negligible, agricultural credit appeared to be an essential input along with modern technology for higher productivity.

Jan et al., (2012) pointed out that other associated reasons for low productivity in agriculture included land fragmentation; lack of managerial skills in farmers, which limited their ability to adopt improved farming practices; and insufficient use of modern technology and input. The latter was a function of the inadequate finance available to the farmers, particularly the smallholders. The matter of enhancing agricultural productivity, therefore, largely depended on inter alia, the availability of finance to farmers.

Saboor et al., (2009) added that the use of modern technology increased demand for credit and resulted in increase in agricultural productivity of small farmers. Access to credit promoted the adoption of yield-enhancing technologies. Adams and Vogel (1990) also supported the argument that most third-world countries studied used credit programmes to promote agricultural output.

Mahmud (2008) and GOB (2009) posited that of all agricultural reform policy interventions aimed at achieving success, the agricultural/rural credit had been considered one of the crucial factors toward sustainable development of the agricultural sector. Abedullah el al., (2009) and Saboor et al., (2009) stated that timely and easy access to credit enables farmers to purchase the required input and machinery for carrying out farm operations and increasing production. Johnson and Cownie (1969) in their study noted that developing countries improved their agricultural output by introducing modern agricultural technology such as chemical fertilisers, recommended seeds, tractors and modern irrigation facilities, among others. But the adoption of such modern agricultural techniques is capital intensive and requires increased financing.

Siddiqi et al., (2004) reported that the flow of credit to farmers had increased demand for input to increase crop production. The elasticity of amount of credit, number of tractors, irrigation, use of chemical fertiliser and pesticides, with respect to agricultural income, indicated that credit (production credit) and tube wells impacted positively on agricultural output.

Audu et al., (2007) stressed the need for agricultural finance, arguing that capital in the form of finance is needed to modernise agriculture because new technologies have to be purchased before they can be used on the farms. They emphasised that farmers' need for finance in consumption and payment for labour during the gestation period of their enterprises. They further argued that inadequate agricultural capital stems from the small size of operations of most farmers, which limited the extent to which savings accrued from surplus output, and consequently stagnated income. Therefore, any system of financial intermediation that would leave a pool of money for investment among farmers would catalyse agricultural production and development.

Richard (1990), Khandker and Faruqee (2003) and Khan et al., (2008) provided empirical evidence that institutional agricultural credit played a key role in enhancing farm production. They argued that without doubt, agriculture could be the main medium for improving the socio-economic conditions of the rural people. Waqar et al., (2008) using time series analysis and applying the error correction model for

Pakistan, found that agricultural credit had a positive impact on the gross domestic product and its effect was more pronounced on the agricultural component. The impact of agricultural credit in reducing poverty was significant both in the short and long-run.

Okurut et al., (2005) also supported the importance of credit when they asserted that in the context of developing countries, agricultural credit was an important instrument for agricultural development. Kadidia (2001), in a major review of constraints to agricultural development for Mali, using the Malian National committee of the Partnership to Cut Hunger in Africa, mentioned the lack of financial resources as one of the major constraints to the growth of its agricultural sector. According to the Committee, one of the key strategies to cut hunger in Mali was to strengthen investments in the rural areas through: financing of hydro-agricultural developments; development of non-bank financial institutions; strengthening of private investments (financing mechanisms, development of alternative collateral, funding guarantees, and insurance mechanisms); facilitate access to credit for producers; strengthening decentralised financial systems; promoting medium and long-term credit on favourable terms; and developing insurance mechanisms to help protect producers' revenues and debt relief for producers.

Studies for Nigeria have also confirmed the positive relationship between finance and agricultural productivity. For instance, Nosiru (2010) showed that micro credit enabled farmers to acquire needed input to increase their agricultural productivity. However, the credit obtained by the farmers in the study area did not contribute positively to the level of output. This was as a result of non-judicious utilisation, or diversion of credits obtained to other uses apart from the intended farm enterprises.

Other studies have sought to link improvement in agricultural production to poverty reduction. Maxwell, (2001), noted that poverty remained a predominantly rural problem and agriculture is generally central to rural livelihoods. Some 70.0 per cent of the workforce in sub-Saharan Africa and 67.0 per cent in South Asia are at least partly engaged in agriculture. Therefore, any improvement in rural incomes should – if only by sheer weight of numbers – have a major impact on poverty.

The most useful assessments of the impact on poverty of changes in agriculture are those that followed farming communities' experiences over a long-term period (Lanjouw and Stern, 1998; Hazell and Ramasamy, 1991). These studies showed that agricultural productivity gains have raised rural incomes in two ways: by directly increasing farmers' incomes and, of particular importance to the poorest, by increasing employment opportunities and wages.

DFID (2004) explained that increased agricultural productivity reduced poverty through four transmission mechanisms including: direct and relatively immediate impact of improved agricultural performance on rural incomes; impact of cheaper food for both urban and rural poor; agriculture's contribution to growth and the generation of economic opportunity in the non-farm sector; and agriculture's fundamental role in stimulating and sustaining economic transition, as countries (and poor people's livelihoods) shift away from being primarily agricultural towards a broader base of manufacturing and services. The paper noted that the potential for future poverty reduction through these four transmission mechanisms depends on the extent to which agricultural productivity can be increased where it is most needed. In a similar research work, Bresciani and Valdes (2007) framed their analysis in terms of three key channels that linked agricultural growth to poverty, namely: labour market, farm income and food prices. They provided a theoretical framework for investigating the quantitative importance of those various channels and then reported findings from six country case studies. They concluded that when both the direct and indirect effects of agricultural growth were taken into account, such growth was more poverty-reducing than growth in nonagricultural sectors.

II.1 Trends in Agricultural Finance in Nigeria

In absolute terms, the trend of loans extended to the agricultural sector by commercial banks in Nigeria showed a consistent upward trend over the years (see figure 1)

Figure 1: Loans to Agriculture, Forestry and Fishery Sectors by Banks (1987-2010)

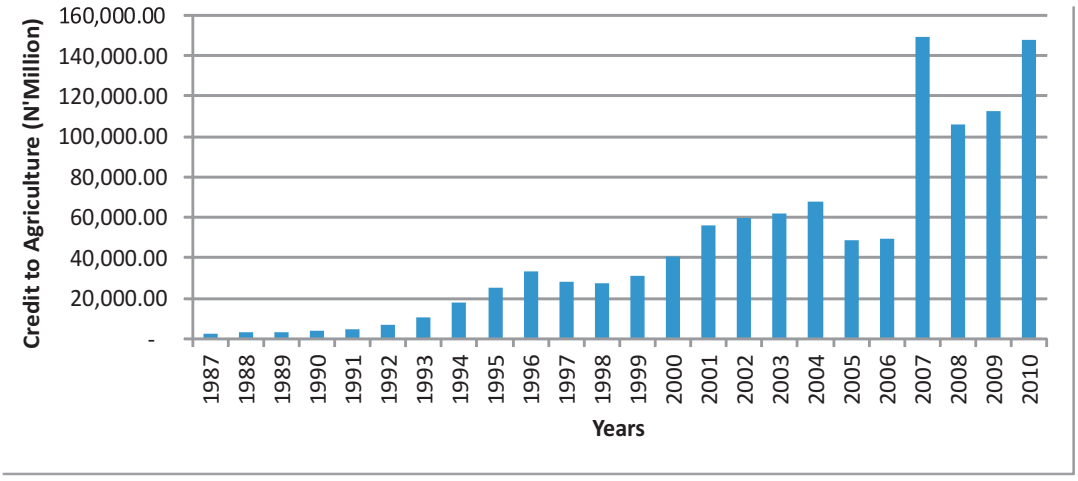
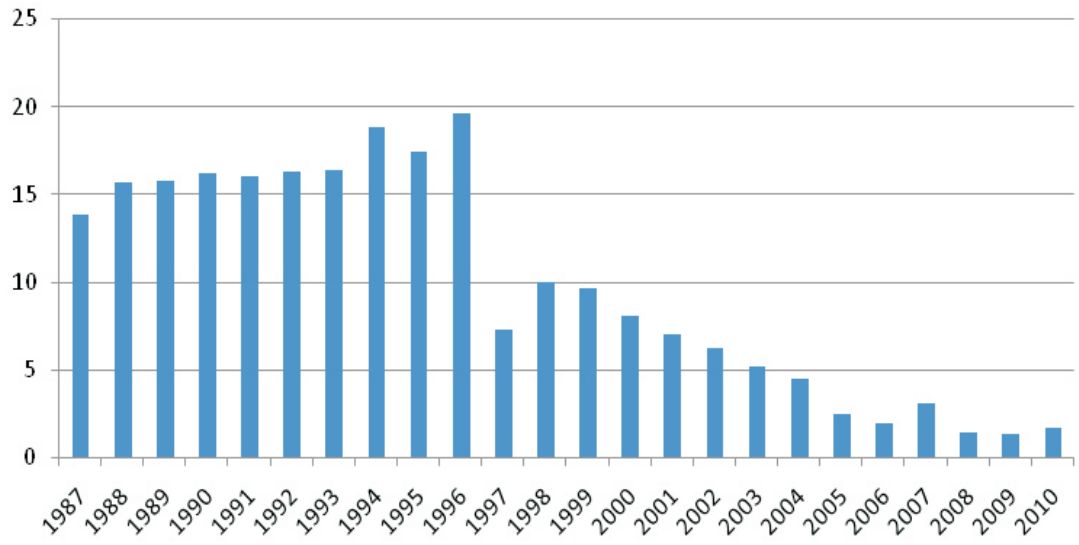


Figure 1 showed a remarkable growth in agricultural credit post-consolidation of Nigeria's banking sector in December 2005. Prior to the banking sector consolidation, agricultural credit was relatively poor fluctuating between ₦2.0 billion to ₦25.0 billion from 1987 to 1995. In 1996, agricultural credit rose significantly to about ₦33.0 billion, but declined to about ₦31.0 billion in 1999. The inception of a democratic governance saw the growth of agricultural credit to about ₦56.0 billion and ₦67.0 billion in 2001and 2004, respectively. At end-2010, loans to agriculture by commercial banks in Nigeria had increased to ₦148.0 billion.

In terms of percentage of bank loans advanced to the agricultural sector, from the period 1987 to 1996, the agricultural sector received between 13-19 per cent of the total loans by commercial banks. The figure reduced to 7.0 per cent in 1998 and even further to 6.0 per cent in 2002. At end-2010, the figures decreased significantly to 1.7 per cent of total number of bank loans advances.

Figure 2: Agricultural Finance as a Ratio of Total Loans Granted (1987- 2010)



From figure 2, it was visible that the share of agricultural loans in total loans made by the deposit money banks (DMBs) was infinitesimal. Several reasons, including riskiness of the sector, long-payback period, national neglect for the sector and others have been adduced as reasons for the trend. To shore up financing for the agricultural sector, the Central Bank of Nigeria had made some strategic financial interventions. Some of these are discussed below:

II.2 Intervention by the Central Bank of Nigeria

II.2.1 Agricultural Credit Guarantee Scheme Fund (ACGSF)

This scheme was established by the Federal Military Government under the Agricultural Credit Guarantee Scheme Fund Decree 1977 (Decree No. 20) and as amended on 13th June, 1988. Thus, the Agricultural Credit Guarantee Scheme Fund formally started operations in 1978. The Fund is managed by the ACGSF management board and the Central Bank of Nigeria.

The purpose of the Fund is to provide guarantee in respect of loans granted by any bank for agricultural purposes (including establishment or management of plantation for the production of cash crops, cultivation or production of various crops, animal husbandry, processing of agricultural products as well as farm machinery and hire services) with the aim of increasing the level of bank credit to the agricultural sector. Loans under the scheme include advances, overdrafts and any credit facility.

A CBN internal survey in April 2012, noted that a total of 3,561 loans valued at ₦502.68 million was guaranteed by six (6) DMBs and some Microfinance banks. This brought the number and value of loans guaranteed in the year to 6,108 valued ₦1.34 billion. Cumulatively from inception in 1978, the figure stood at 760, 636 loans valued at ₦53.68 billion. The distribution of number of loans guaranteed by purpose indicated that food crops accounted for 3,384 loans (95.0 per cent), followed by livestock and cash crops which recorded 123 loans (3.5 per cent) and 24 loans (0.7 per cent), respectively. Fisheries, mixed farming and others recorded 15, 1 and 14 loans, respectively.

II.2.2 Agricultural Credit Support Scheme (ACSS)

The Agricultural Credit Support Scheme was established through the initiative of the Federal Government and the Central Bank of Nigeria with the support and participation of the Bankers Committee to finance large ticket agricultural projects with an interest rebate of 6.0 per cent upon timely repayment of the facility. The agricultural processes covered under the ACSS include:

(a) Establishment or management of plantations;
(b) The cultivation or production of crops;
(c) Livestock (animal husbandry, poultry, fishery etc.); and
(d) Farm machinery and hire services.

The purpose of the ACSS is to develop the agricultural sector of the Nigerian economy by providing credit facilities to farmers at single digit interest rate. This is to enable farmers exploit the untapped potentials of the sector with a view to reducing the cost

of agricultural production, and increase output on a sustainable basis. The expected outcome is a fall in prices of agricultural produce, especially food items, thereby leading to reduction in inflation rate, generate surplus for export, diversify the revenue base and thus, increase foreign exchange earnings for the country. At end-April 2012, no rebate was paid. However, the total rebate paid from inception to end-April 2012 stood at 43 projects valued at ₦872.45 million.

II.2.3 The Commercial Agricultural Credit Scheme

The CACS was established by the CBN in collaboration with the Federal Ministry of Agriculture and Rural Development as part of the developmental role of the CBN. It was funded through the issuance of FGN Bond worth ₦200 billion. The essence of the scheme was to promote commercial agricultural enterprises in Nigeria. The fund was released to the Bank of Industry and made available to DMBs for on-lending to farmers/state governments at single digit interest rate. State Governments could borrow up to N1.0billion for on-lending to farmers' cooperative societies and other areas of agricultural development provided such initiatives/interventions were in line with the set objectives.

So far twenty nine (29) states participated in the scheme. In April 2012, the sum of ₦2.938 billion was released to 3 banks with respect to 3 projects bringing the total to ₦178.269 billion with respect to 227 projects (198 private promoters and 29 State Governments). By value chain 47 per cent of the private projects were for production activities, while 38 per cent were for processing activities. Marketing and storage accounted for 9 per cent and 6 per cent, respectively. For the state sponsored projects, processing accounted for 51 per cent followed by production which accounted for 33 per cent. Other activities shared the remaining 16 per cent.

II.2.4 Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL)

Available statistics revealed that the CBN had approved ₦75 billion for the take-off of Nigerian Incentive-Based Risk Sharing in Agricultural Lending (NIRSAL). It had also guaranteed 75.0 per cent loans provided by DMBs to farmers across the 36 states of the Federation and the Federal Capital Territory as part of concerted efforts to transform the agricultural sector. The guarantee would be issued by the NIRSAL to the farmers in the states and the FCT through commercial banks and other financial institutions.

The initiative (NIRSAL) mobilised financing for Nigerian agribusiness through the use of credit guarantees to address the risks associated with default. It was targeted at

encouraging financial institutions to be more receptive to doing business with agribusinesses. It was aimed at creating greater access to finance through integration of end-to-end agriculture value chains such as input producers, farmers, agro dealers, agro processors and industrial manufacturers with agricultural financing value chains – loan product development, credit distribution, loan origination, managing and pricing for risk, and loan disbursement.

The integration was driven by the NIRSAL's 5 pillars, particularly the Risk Sharing Pillar and the Technical Assistance pillars such as Risk Sharing Facility, ₦45 billion; Insurance Facility, ₦4.5 billion; Technical Assistance Facility, ₦9 billion; Agricultural Bank Rating, ₦1.5 billion; and the Bank Incentive Mechanism, ₦15 billion (CBN, 2011).

III. Methodology and Data Analysis

III.1 Methodology

The paper employed the vector error correction mechanism (VECM). The error correction mechanism had emerged as one of the effective contemporary tools for ascertaining the dynamic paths of variables and ability to return to long-run equilibrium (converge) after a shock. The preference for VECM followed Phillips (1991) and Gonzalo (1994) who ascribed better properties to VECM than several other estimating frameworks for long-run relationships. The VECM is preferred for data sets where cointegration is detected. A VECM investigates the long-run and the short-run dynamic co-movements among economic variables.

In a VECM, all variables entered as endogenous in the sense that none was held as dependent variable. In the reduced-form structural equations, the disturbance in the error components of the impulse variable triggered a persistent change in the error process. Then, the impulse response function enabled the isolation of the effects on the error process due to the included variables, while the variance decomposition indicated the contribution of each of the variables to the change in the behaviour of any choice component. Therefore, for the 'true' effects to be traced, particular attention was given to the ordering of the variables in the model. The Cholesky decomposition ranked the variables from the right according to the speed of response to the stimuli. This was the approach adopted in the paper.

A typical VECM model is specified as follows:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \ldots + \Gamma_{k-1} \Delta Z_{t-k-1} + \pi Z_{t-1} + \upsilon_t$$

Where Γi = - (I – A1 - ...-Ai) (i = 1... k-1), a matrix representing short-term adjustments and Π = - (I – A1 - ... – Ak), being a coefficient matrix showing the long-run relationship between the variables in the vector. Z_t is px1 vector of stochastic variables integrated of order 1, k is the lag length and υ_t is p x 1 Gaussian white noise residual factor.

III.2 Variables

The size of agricultural output depended on the size of input and total factor productivity. Productivity relates to increasing output without proportionate increase in input. Thus, it essentially arises from other factors, including research and development, education extension services, among others. Given the level of development of the Nigerian economy and the paucity of data, it would be difficult to ascertain how much of resources expended on the total productivity factors. The conventional market measure for input into agricultural production included fertilisers, pesticides, energy, feed and seed and livestock – these are intermediate inputs, labour, capital – equipment real estate, inventories. Finance was key for acquiring capital and other modern technologies. Thus, the operating model in this paper could be set as three factor production function of the agricultural sector. The factors included land, labour and finance, being a proxy for capital. Land was measured as the land area cultivated per annum. Labour was measured by the number of labour force employed in the agricultural sector (Al), while finance (Af) was measured by loans made by the banks to the agricultural sector. Given the peculiarities of the Nigerian economy, the exchange rate entered the model to indicate the effect of foreign developments on the import of farm input. The ratio of total agricultural output to all intermediate input, proxied by finance, measured total factor productivity (Prtvty). Total output was measured by total agricultural gross domestic product. Rainfall entered the model with positive expectation for output because agricultural production depended mainly on the vagaries of weather in the country. The irrigation component was subsumed in finance

.

The *apriori* expectation for land was positive as the postulation was that the more the size of land cultivated, the higher the output. This was with the assumption that intermediate farm input was separated from land. Labour, productivity and finance moved in the same direction as total output, while depreciation of naira increased imported input prices. However, in the computations, land was assumed fixed while rainfall and exchange rate were treated as exogenous variables. The data were sourced from the CBN Statistical Bulletin (various issues) and the website of the National Bureau of Statistics.

III.3 Data Properties

III.3.1 Unit Root Tests

The unit root test indicates whether the included variables are stationary. Agricultural gross domestic product (Agdp), which is used as the measure of agricultural production contains unit root at level. However, the first difference is stationary even at the 99 per cent confidence level. Productivity is stationary at level. Rainfall (RF), exchange rate (xr), and agricultural finance (AF) are stationary at the first difference. However, agricultural finance is stationary at level only within the 95 and 90 per cent confidence levels. The tests were conducted using the Augmented Dickey-Fuller estimates. And the sample period spanned 1980 to 2011.

III.3.2 Test for Cointegration

The Johansen Cointegration test was applied. The test results are found in Table 1

Table 1: Trace Test for Cointegration Result

Unrestricted Cointegration Rank Test (Trace)

Table 1: Trace Test for Cointegration Result

Hypothesised No. of CE(s)	Eigen value	Trace Value	0.05 Critical Value	Prob. **
None*	0.869214	145.9745	95.75366	0.0000
At most 1 *	0.813281	101.2224	69.81889	0.0000
At most 2 *	0.678660	64.30307	47.85613	0.0007
At most 3 *	0.605072	39.32744	29.79707	0.0030
At most 4 *	0.368274	18.88830	15.49471	0.0148
At most 5 *	0.329184	8.783719	3.841466	0.0030

Trace test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejecting of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values

The detection of cointegration indicated that there were long-run relationships among the variables and therefore, allowed the application of the vector error correction methodology.

Table 2: Max-eigenvalue Test for Cointegration Result

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesised No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistics**	**0.05 Critical Value**	**Prob. ****
None*	0.869214	44.75219	40.07757	0.0138
At most 1 *	0.813281	36.91928	33.87687	0.0210
At most 2	0.678660	24.97563	27.58434	0.1041
At most 3	0.605072	20.43914	21.13162	0.0623
At most 4	0.368274	10.10458	14.26460	0.2052
At most 5 *	0.329184	8.783719	3.841466	0.0030

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejecting of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values

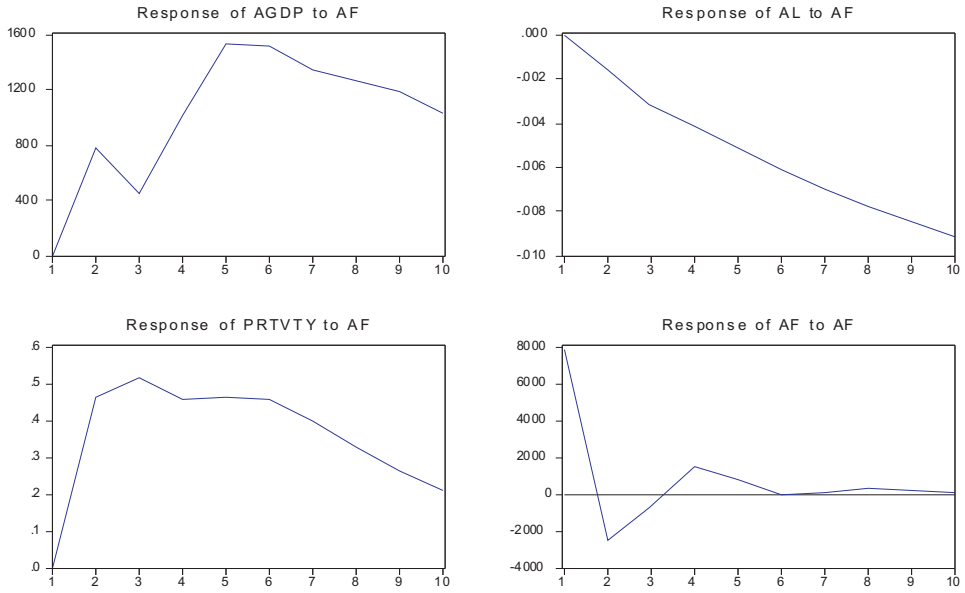
IV. Interpretation of Results

IV.1 Impulse Response Analysis

From the econometric estimations in figure 3, the impulse response function traced the effect of innovations on finance on the volume of agricultural production, and other included variables. The results in chart 3 showed that a one standard deviation innovation on agricultural finance (AF) left agricultural production, labour force employed in the agricultural sector (AI), and agricultural productivity unchanged in the first period. In the second period Agdp increased by 15.5 per cent. This result underscored the fact that finance was an important factor for growing agriculture. The increase was sustained in the third period, but only up to 9.0 per cent. In the fourth and fifth periods, Agdp declined by an average of 10.0 per cent. This was attributed to the more than proportionate pull-down effect of other variables in the model, particularly adverse weather. Agdp showed the same negative change from the seventh to the ninth period. But there were modest improvements in the sixth and tenth periods.

The reaction of labour met the *apriori* expectations, except in the second period. From the third period to the tenth period, the increase in financing consistently reduced the amount of labour input to agricultural production. Theory supported this observation as the injection of capital increased the productivity of labour and hence reduced the number of labour per unit of output. Productivity also showed the same trend. And this should be obvious because the additional financing reduced the unit of labour required for production as productivity was boosted with additional finance.

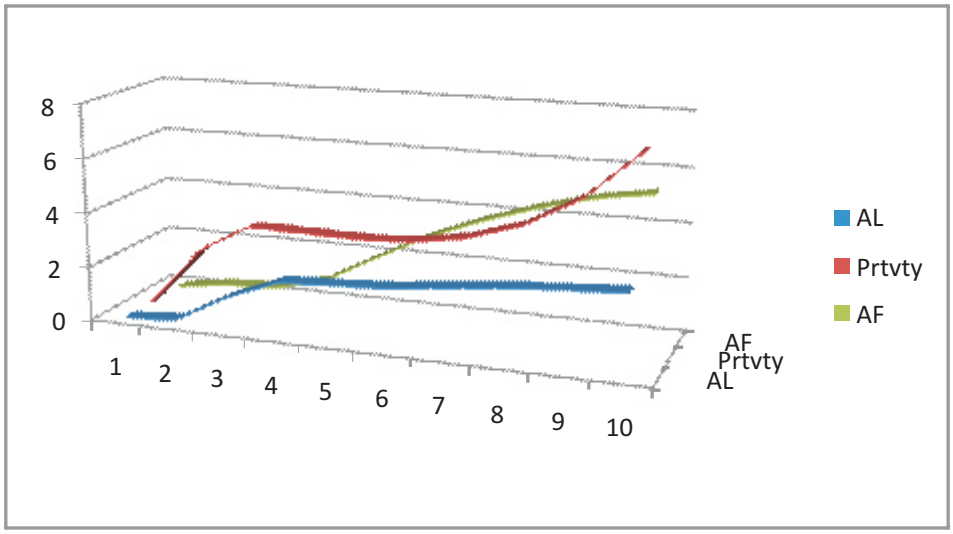
Figure 3. Response to Cholesky One S.D. Innovations



IV.2 Variance Decomposition

The variance decomposition in table 3 indicated that the relative contribution of each of the included variables to changes in any chosen variable. To determine the fraction of Agdp that was supported by financing, the decomposition of Agdp indicated that in the first period, the behaviour of Agdp was entirely explained by itself. The outcome conformed to logic because the innovation on agricultural finance would only have lagged effect. In the second period, 0.3 per cent of the changes in Agdp were explained by finance. From the third period, the contribution of finance progressively increased, peaking at 5.2 per cent in the tenth period. The contribution of productivity followed a similar pattern from the second period when it contributed 2.2 per cent to total variation of Agdp. Its contribution peaked in the tenth period when it contributed 7.2 per cent. The contribution of labour ranged from 0.1 per cent in the second period to the highest level of 2.9 per cent in the tenth period.

Chart 3: Relative Contributions to Agdp by labour, productivity and finance.



All through the periods of impact, at least 85.0 per cent of all the variations in Agdp were not explained by financing, productivity and employment. The implication of this was that agricultural production in Nigeria depended, largely on the natural developments. This finding accurately mimicked the state of agriculture in the Nigeria. Agricultural financing was weak, so was investment in the sector. Primitive techniques still abound so that productivity was at low ebb. Little wonder therefore, most of the staples and other agricultural produce were imported from abroad.

Table 3: Variance Decomposition of AGDP

Period	S.E.	AGDP	AL	PRTVTY	AY
1	12191.14	100.0000	0.000000	0.00000	0.000000
2	14146.76	97.35131	0.130805	2.216911	0.300972
3	14471.26	95.12398	1.197142	3.294042	0.384835
4	14567.95	93.88427	1.981795	3.269783	0.864148
5	14662.12	92.74310	2.080602	3.228108	1.948186
6	14761.25	91.54804	2.184420	3.297496	2.970042
7	14871.93	90.19237	2.421303	3.634541	3.751787
8	14998.08	88.68461	2.636355	4.270804	4.408228
9	15154.13	86.89021	2.779487	5.404110	4.926197
10	15365.09	84.65420	2.895373	7.203966	5.246456
Cholesky Ordering: AGDP AL PRTVTY AF					

V. Conclusion and Recommendation

The paper set out to ascertain the relative contribution of agricultural finance in total agricultural production in Nigeria as the quest for food security rages. Survey of literature indicated a positive correlation between funding agriculture and the sector's performance. This positive correlation between agricultural finance and total output in the agricultural sector was also affirmed in the study. A close observation of the trend of agricultural financing in Nigeria showed that the agricultural sector was grossly disadvantaged in terms of open market financing. This observation was read to have led the CBN to embark upon strategic financial interventions to boost the sector.

A major inference from the study was that, despite the fact that finance was found to aid agricultural production, the relative contribution of finance to total agricultural production in Nigeria was infinitesimal. This finding coincided with the actual situation in the country. More importantly, it was found that farm input, employment, productivity, and finance hardly explained 15.0 per cent of total agricultural output. Therefore, it was easy to conclude that agricultural production in Nigeria depended mainly on the natural resources, especially, weather conditions.

It is, therefore, recommended that financing for agriculture should be boosted for the goal of achieving food security to be met. However, because of the inherent peculiarities of that put the sector at a disadvantage in competitive financing, it is further recommended that the authorities intervene to support the sector directly as distinct from market means.

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Structural Change and Real Output Growth in Nigeria: A Cointegration Analysis

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Abstract

The study employed the Johansen (1988) and the Johansen and Juselius (1990) multivariate maximum likelihood method within a Vector Autoregressive framework to explore the impact of structural reforms on the level of real output in Nigeria. We fit the equation separately for two sub-samples, the pre-reform and the market-reform periods, to enable comparisons of the outcomes under alternative policy regimes. We further estimate the model using data that covered the entire sample period to evaluate the total effects and include a dummy variable to capture the impact of the policy shift. The Johansen cointegration test confirms the existence of long-run equilibrium relationships among the variables. Various diagnostic tests conducted confirmed the robustness of the results. The Chow Breakpoint test rejected the null hypothesis, which states that the real output function remained the same before and after structural reforms. The results of our parsimonious models suggest that real exchange rate, real credit to the private sector and the previous level of real output are the most consistent drivers of real income in Nigeria. The long-run Granger causality test supports that the above variables could help predict the future level of real output. Since it is evident that the price system cannot guarantee the desired moderation in interest rates, the monetary authorities need to take extra measures to reduce interest rates in different segments of the market. Government can also play complementary roles by limiting the size of budget deficits to cut down on huge domestic borrowing, which now runs into trillions of naira. This will not only improve investment but will go a long way to free additional credit for onward lending to the private sector. The present stability in the foreign exchange market also needs be sustained to forestall any further depreciation in the exchange rate. Above all, more stable sources of foreign exchange need to be urgently sought if the monetary authorities are to meet the ever increasing demand for foreign exchange to stabilise rates in the market.

Keywords: Structural Reforms, Real Output, Cointegration, Error-Correction Model

JEL Classification Numbers: F41, F43, O42, O47

I. Introduction

For more than two and a half decades after the adoption of structural reforms, the Nigerian economy has shown no appreciable progress. The Structural Adjustment Programme (SAP) adopted in June 1986 marked a major shift in the

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country's economic history. This altered the structure of the economy from a largely regulated or controlled to a mostly liberalised economy, with greater reliance on market forces. The above reforms were further strengthened with the implementation of a home-grown National Economic Empowerment and Development Strategy (NEEDS) in 2003, which imbibed the same *laissez-faire* principles. Despite the removal of complex administrative controls to ease distortions in the system, the nation's development objectives remain unattainable. The economy has also become more dependent on the oil sector with economic growth diverging from set targets. Though modest growths were recorded in the nominal gross domestic product (GDP) from 2003, there are no strong indications of a corresponding growth in real output.

A number of studies have attempted to establish reasons for the low performance of the economy despite the implementation of market reforms, but most of the authors hinged their arguments on theoretical underpinnings with little or no empirical support. Majority of those that volunteered empirical evidence also relied on traditional estimation techniques in drawing inferences about the implications of the deregulation policy in Nigeria. This is in addition to their use of nominal measures that do not reflect the actual achievement in production activities. Others confined their studies to specific sectors on the basis of which they came up with generalisations about the overall performance of the economy. Another major omission in the past studies is the non-recognition of the obvious reality that reforms generally have delayed effects on the level of output, and in some cases the lags can be long.

The aforementioned limitations and failure of the past studies to adequately account for the impact of the structural reforms informed our resolve in this paper to evaluate the impact of the structural change, occasioned by the adoption of the SAP, on the level of real output in Nigeria using system approaches, the Johansen (1988) and the Johansen and Juselius (1990) cointegration and error correction techniques. Our approach, however, marks a significant departure from the past in view of the segregation of the data in line with the major policy episodes; the inclusion of lag regressors in our real output model, and the estimation using modern approaches, system cointegration and error correction modeling.

The study, therefore, examined the performance of the economy in the light of the major structural changes. Have changes in the structural relationships arising from the shift to deregulation policy resulted in any significant change in the real output function? The study would afford us the opportunity to compare Nigeria's

performance under two-alternative policy regimes. It would also enable us to offer informed-policy recommendations regarding the need to either strengthen or reject the ongoing market-oriented strategies. The study was structured into six Sections. Following this introduction was Section II, which discussed the theoretical issues, including the conceptual framework and empirical literature. Section III examined the profile of Nigeria's recent reforms. In Section IV, the methodology, incorporating the estimation technique and model specifications, were provided. The data analysis and discussion of empirical results are contained in Section V. Section VI provides the concluding remarks and policy recommendations.

II. Conceptual Framework and Empirical Literature

II.1 Conceptual Framework

The impact of structural reforms in Nigeria could be analysed within the framework of the market mechanism, which dated back to Adam Smith. Smith argued that individuals pursuing their self-interest would be led 'as if by an invisible hand' to do things that are in the interests of society as a whole, adding that the pursuit of self-interest, without any central direction, could produce a coherent society making sensible allocative decisions (Begg, Fisher and Dornbush, 1984). The neo-classical postulations later popularised the classical doctrine of the invisible hand.

The neo-classical theory of markets and the price system dominated economic thoughts over a long period before the Great Depression of the 1930s. However, the inability of the invisible hand to function efficiently during the Great Depression made a case for government intervention in the economy. With the advent of Keynesianism, protectionist views became dominant in the 20th century and for decades majority of developing countries implemented industrialisation policies based on a very limited degree of international openness. A large number of development economists embraced the protectionist view from the 1950s through the 1970s and devoted enormous energy to design planning models that relied on import substitution ideas. Although the protectionist paradigm had gained prominence, the findings of various investigations on the implications of alternative trade regimes later revealed that open and outward-oriented economies had out-performed those pursuing protectionism. The obvious implication was that developing countries should move away from protectionist and restrictive trade practices and open up their foreign trade sector (Edwards, 1993).

The debt crisis of the early 1980s later compounded the problem as economic growth collapsed in many developing countries forcing them to embrace reforms that emphasised the reduction of trade barriers and the opening of international trade to external competition. This philosophy was also supported by the World Bank, the IMF and other multilateral institutions, which required developing countries to embark on trade liberalisation and to open up their external sector as a condition for receiving financial assistance. Michaely, Papageorgiou and Choksi (1989) saw trade liberalisation as "any change that leads a country's trade system towards neutrality in the sense of bringing its economy closer to the situation, which would prevail if there were no governmental interference".

Another essential feature of the structural reforms was the deregulation policy adopted in many developing countries. Deregulation entailed the appropriate realignment of the fiscal, monetary, trade, pricing and exchange policies to enthrone an environment that was conducive for growth. Deregulation was, thus, intended to foster competition, promote efficiency and optimise the allocation of credit and other scarce financial resources to enhance the potentials for growth and development. Deregulation was also imperative in freeing an economy from financial repression, which was a conscious distortion of financial prices by the regulatory authorities. Such interference in the financial market promoted rent-seeking behaviours misallocating financial resources and imposing substantial costs on the society (Ayadi, Adegbite and Ayadi, 2008). It was in line with the above economic thinking that the Federal Government of Nigeria embarked on the Structural Adjustment Programme (SAP) in mid-1986.

II.2 Empirical Literature

The best strategy for enhancing economic growth remained an unsettled issue in the literature. Evidence abounds on a number of developing countries that liberalised their domestic economies but were unable to achieve sustainable growth. Arestis (2005) in a review of the relationship between financial development and economic growth found no convincing empirical evidence in support of the propositions of the financial liberalisation hypothesis. He, thus, agreed with Stiglitz (1998) that the financial liberalisation thesis was "based on an ideological commitment to an idealised conception of markets that was neither grounded in fact nor in economic theory" but one that falls under the rubric of some "innocent fraud" with a continuing divergence between conventional wisdom and reality.

Paudel and Perera (2009) found significant negative impact of financial liberalisation on economic growth of Sri Lanka in the short-run and a positive but insignificant role in the long-run. Tswamuno, Pardee and Wunnava (2007) also investigated the impact of financial liberalisation on the economic growth of South Africa and concluded that post-liberalisation foreign portfolio investments had no positive effect on economic growth. They, however, found that foreign portfolio investment and increased turnover contributed positively to economic growth in a more controlled pre-1994 South African economy. Trade liberalisation may, therefore, be considered unnecessary for successful outward-oriented strategies (Sachs, 1987). The above findings also appear to be in consonance with Taylor's (1991) declaration that "the trade liberalisation strategy is intellectually moribund", and that there are "no great benefits (plus some losses) in following open trade and capital market strategies".

Furthermore, Shaw (1973) revealed that distortions in financial prices – including interest and foreign exchange rates – reduced the real level of output and retarded the development process. Eichengreen (2001) stressed that financial liberalisation may be catastrophic for financial stability and macroeconomic performance if distortions exist. In another development, Ayadi, Adegbite and Ayadi (2008) established that financial development and economic growth had no consistent relationship in post-SAP Nigeria. This may not be surprising since financial liberalisation was not expected to produce the desired effects where domestic institutional capacities remain fragile (Bakeart, Harvey and Lundblad, 2005).

On the other hand, financial liberalisation has been found to stimulate growth in several countries. Pulling together some existing theory and evidence in the literature to reassess the impact of international financial liberalisation on economic growth, Levine (2001) found that liberalising restrictions on international portfolio flows enhances stock market liquidity, which in turn accelerates economic growth primarily by boosting productivity growth. She also found that foreign bank presence tends to enhance the efficiency of the domestic banking system which, in turn, spurs economic growth mainly by accelerating the level of productivity.

Bekaert, Harvey and Lundblad (2005) in a study of the growth impact of financial liberalisation across countries established that equity market liberalisations, on average, lead to a 1.0 per cent increase in annual real economic growth of the 50 liberalised countries covered in the study. Chaudhry (2008) discovered a significant positive impact of financial liberalisation variables on economic growth and

investment in Pakistan. Using the Johansen Cointegration tests, Banam (2010) investigated the impact of financial liberalisation on economic growth in Iran for the period 1965 to 2005. The results showed that financial intermediation, capital, research and development, and financial liberalisation have positive and statistically significant impact on economic growth. Reserve requirement ratio has a negative but statistically insignificant impact on economic growth while exports have positive but statistically insignificant impact on economic growth. The results also indicate that labour has a negative impact on economic growth, implying that the labour force in Iran was not effective in promoting economic growth, contrary to what existing theories suggest.

Bonfiglioli (2005) equally assessed the effects of international financial liberalisation and banking crises on investments and productivity in a sample of 93 countries from 1975 to 1999 and provided empirical evidence that financial liberalisation spurs the level of productivity and marginally affects capital accumulation. Both levels and growth rates of productivity were found to respond to financial liberalisation and banking crises. The study also provided evidence of conditional convergence in productivity across countries. Stiglitz and Uy (1996) also found that financial market liberalisation contributed to the rapid growth of the Asian tigers and that the respective governments only intervened to correct for market imperfections. Bakare (2011) established a long-run significant relationship between financial sector liberalisation and economic growth. The multiple regression results showed a significant negative relationship between financial sector liberalisation and economic growth in Nigeria. He, thus, advised the authorities to revisit the SAP with a view to enhancing the effectiveness and efficiency of the financial sector.

Iganiga (2010) found that the gradual increase in the capital base of firms in the financial sector rekindled public confidence and increased savings in the Nigerian financial sector, but added that interest rate deregulation resulted in high lending rates that crowded out private investment. This was antithetical to the catalytic role that the liberalisation policy was intended to achieve. Okpara (2010) demonstrated the significant sensitivity of real GDP, national savings and foreign direct investment (FDI) to the financial liberalisation policy in Nigeria. He ascertained the existence of a significant difference between the performance of real GDP, national savings and FDI before and after the introduction of financial liberalisation. The result, however, showed no significant difference between the pre-liberalisation and post-liberalisation rate of inflation and financial deepening in the country. He, thus, concluded that

financial liberalisation has no effect on financial deepening and the rate of inflation but that it positively increases the growth of GDP in Nigeria.

III. Nigeria's Structural Reforms

Nigeria's structural reforms began with the adoption of the Structural Adjustment Programme (SAP), which was in response to the adverse developments that characterised the structural changes in the nation's economy. The country had evolved from a poor agrarian economy to a rich oil producer in the early 1970s. By 1975, oil had accounted for more than 80 per cent of government revenue and 95 per cent of foreign exchange earnings. Following the collapse of oil prices in the early 1980s, the country's economic fortunes deteriorated, imposing an unhealthy state with chronic symptoms that included balance of payment problems, galloping inflation, rising unemployment, increased poverty, mounting debt burden, and persistent budget and current account deficits.

The Economic Stabilisation Act enacted in 1982 provided stringent demand management measures but failed to address the above negative trends. Among the adopted austerity measures were: the freezing of public sector wages/salaries, the imposition of ceilings on foreign exchange disbursements, import restrictions, the freezing of capital expenditure, and increase in customs tariffs and prices of petroleum products, as well as user charges on public utilities. Restrictions were also placed on bank borrowing by the private sector and foreign borrowing by sub-national governments.

The apparent failure of the austerity measures necessitated the adoption of a broad-based SAP to restore internal and external balance. Trade liberalisation and a market-determined exchange rate system were the key policies for structural adjustment, while monetary and fiscal policies were the primary instruments of financial stabilisation. Administrative controls (including credit allocations, exchange and interest rate ceilings) were all eliminated to remove the distortions in the economy created by the illiberal policies to improve efficiency, promote investment and enhance growth. Regardless of the policy reversals that characterised the post-SAP period, the exchange and interest rate regime was generally flexible. The conduct of monetary policy improved as price developments provided market signals that were essential for monetary adjustments. The central bank influence on interest rates in different segments of the financial market was consequently enhanced. The monetary authorities became equipped to influence the level and direction of

monetary aggregates via adjustments in the central bank policy rate, the Minimum Rediscount Rate (MRR).

The perceived insensitivity of market rates to the nominal anchor rate (MRR) later necessitated a transformation of the monetary policy framework in December 2006 to reduce the volatility in inter-bank rates, facilitate inter-bank trading and enthrone a transaction rate that would better enhance the transmission of monetary policy actions (Okpara, 2010). This was complemented with the discount window operations which provided overnight accommodation for authorised dealers through the standing lending and standing deposit facilities. The applicable rates were periodically determined by the CBN in response to the prevailing monetary conditions.

Additional measures[1] were also put in place to address some of the problems plaguing the financial sector. These include: the upward review of capital adequacy standards, deregulation of the capital market, liquidation of distressed banks, strengthening of prudential regulations, enhancement of disclosure standards to reflect risk exposures in the banking system, enlargement of the powers of the Central Bank of Nigeria (CBN) towards the achievement and maintenance of monetary stability and financial soundness, enforcement of dormant laws (e.g. dud cheques), anti-money laundering and other related offences regulation, establishment of the Nigerian deposit insurance corporation (NDIC) to inspire the confidence of especially small depositors and the consolidation of the banking industry through mergers and acquisitions.

These new reforms embarked upon from 2004 were meant to enthrone a more resilient, efficient and sound financial system. The consolidation of the banking system was partly aimed at increasing the capital base of Nigerian banks to improve their lending capacity to the real sector, curtailing banks' risks to improve their resilience to systemic distress, and enhance competition to facilitate the evolution of Nigerian banks as global players. As a result, the capital base of banks rose from ₦2.0 billion in 2004 to a minimum of ₦25.0 billion at end-December, 2005, while the number of banks fell from 89 to 25 "strong banks". Stock market indices witnessed astronomical growth as public confidence in the banking system improved.

By 2008, the impact of the global financial meltdown and the inadequacies that characterised the banking consolidation exercise triggered changes that resulted in fresh crisis. A holistic investigation into what went wrong leading up to the banking crisis

1 See Iganiga (2010) for comprehensive review of the financial sector reforms in Nigeria.

in 2008 found eight interrelated factors responsible. These were macroeconomic instability caused by large and sudden capital inflows, major failures in corporate governance, lack of investor and consumer sophistication, inadequate disclosure and transparency about the financial position of banks, critical gaps in the regulatory framework and regulations, uneven supervision and enforcement, unstructured governance and management processes at the CBN/and weaknesses in the business environment. The capital flight that greeted the uncertainties surrounding the global financial crisis in conjunction with other factors led to a 70 per cent collapse of the stock market from 2008 to 2009 (Sanusi, 2012). Many banks that were unduly exposed to the capital market incurred huge losses. The central bank had to inject funds to rescue 8 of the banks to restore confidence and sanity in the banking system. This led to the removal of top executives of the affected banks and the subsequent prosecution of those culpable.

The central bank commenced another round of reforms under the "The Project Alpha Initiative" to transform the financial system, in particular the banking sector. The reforms sought to address the underlying problems, integrate the previously fragmented reforms and align them with the ultimate goal of achieving a sustainable inflationary growth. Apart from enhancing banks' capital base, the new initiative aimed at strengthening the regulatory function of the CBN through the adoption of risk-focused and rule-based regulatory framework; a zero tolerance in regulatory framework in data/information rendition/reporting and infractions; a strict enforcement of corporate governance principles in banking; an expeditious process for rendition of returns by banks and other financial institutions through the Electronic Financial Analysis and Surveillance System (e-FASS); a revision and updating of relevant laws for effective corporate governance and ensuring greater transparency and accountability in the implementation of banking laws and regulations; as well as the introduction of a flexible interest rate based framework that treats the monetary policy rate as operating target. The new framework enabled the central bank to be proactive in countering inflationary pressures. The corridor regime also helped the bank to check the existing wide fluctuations in the interbank rates, thereby engendering confidence in the banking system (Sanusi, 2012).

The most recent innovation was the introduction of "Cash less Policy" to minimise the operating costs associated with huge cash transactions, lessen the challenges to efficient currency management and enhance the national payments system. The policy was also expected to fast-track the country's adoption of global best practices

in the settlement of transactions using cheques and electronic payments. Efforts were made to reduce the cheque clearing cycle to T+1. It became possible to make payments up to ₦10 million through the clearing system with a cheque. The new cash withdrawal policy imposes penalties on cash withdrawals beyond ₦500,000 from individual accounts and ₦3,000,000 from corporate accounts. This was intended to reduce the volume of currency outside banks and allow for more effective and efficient monetary policy.

The CBN also took steps to integrate the banking system into global best practice in financial reporting and disclosure through the adoption of the International Financial Reporting Standards (IFRS) in the Nigerian banking sector by end-2010. This helped to enhance market discipline, and reduce uncertainties, thereby limiting the risk of unwarranted contagion.

The central bank also reviewed the Universal Banking Model adopted in 2001 to encourage banks to focus on their core banking business. The new model categorised banks into commercial, merchant (investment) and specialised banks, in addition to development finance institutions. Commercial banks are sub-divided into regional, national and international banks. Specialised banks deal in microfinance, mortgage and non-interest banking. Non-interest banks are further sub-divided into regional and national banks. The introduction of non-interest banking was meant to attract fresh institutional players and new markets to deepen the financial system in addition to enhancing financial inclusion. The only licensed non-interest bank in the country (Jaiz Bank Plc.) opened for business on Friday, January 6, 2012.

The reforms repositioned Nigerian Banks among the major players in the global financial market with many of them ranking among the top 20 banks in Africa and among the top 1000 banks in the world. The spread between the lending and deposit rates moderated to 9.7 per cent as at end-December 2011, from 12.2 per cent in 2010. This has also contributed to the existing macroeconomic stability in the economy with inflation moderating to 10.3 per cent at end-December 2011. The volatility in exchange rate also reduced with the premium remaining within the international standard of 5.0 per cent. The removal of distress banks and adherence to code of corporate governance also enhanced confidence in the banking system. The reform of the payments system further popularised the use of electronic payments in Nigeria. The establishment of the Asset Management Corporation of Nigeria (AMCON) equally helped to resolve the problem of non-performing loans in the Nigerian banking system.

AMCON recently acquired the non-performing risk assets of some banks worth over ₦1.7 trillion, and this was expected to boost banks' liquidity, as well as enhance their safety and soundness. With the intervention of AMCON, the banking industry ratio of non-performing loans to total credit significantly reduced from 34.4 per cent in November 2010 to 4.95 per cent at December 2011 (Sanusi, 2012).

IV. Methodology

The study employed cointegration and error correction techniques to establish the short- and long-run relationships between real output (RGDP) and the relevant indicators of economic reform for the 1960-2011 time period. The chosen approach provides more powerful tools for testing hypotheses about the relationship between non-stationary time series where data sets are of limited length. The danger in using linear regressions on non-stationary time series is the tendency to produce spurious correlation. The presence of unit roots in our data series and the inadequacies associated with linear regressions necessitated our choice of a superior methodology, the cointegrating vector approach. The approach also provides the best estimation mechanism as the Gauss-Markov theorem indicates that the least squares technique provides the best linear unbiased estimator through which straight line trend equations could be estimated.

IV.1 The Data

The study used annual time series data for the period 1960-2011. The period was deliberately chosen to include the major episodes under which Nigeria implemented different policy regimes. The time was also considered adequate to capture both the short and long-run dynamics. The data were obtained from various editions of the CBN Statistical Bulletin and CBN Annual Report and Statements of Account. The annual time series data were standardised to capture changes in the general price level to enable us use real as against nominal values. The relevant macroeconomic variables, therefore, include real gross domestic product (RGDP), the degree of openness (DOP), real exchange rate (RER), real interest rate spread (RIRS), real credit to the private sector (RCPS), real gross national savings (RGNS), real foreign direct investment (RFDI) and manufacturing capacity utilisation (CAPUT). DOP captured the overall impact of trade liberalisation, which was occasioned by the changes in the general structure of the economy, while RER and RIRS reflected the price effects, and RCPS, RFDI, RGNS and CAPUT mirror the outcome effects.

IV.2 Estimation Technique

The model was estimated under three different scenarios. First, the equation was fitted separately for two sub-samples - the pre-reform (1960-1985) and the market-reform (1986-2011) periods - to compare the drivers of real output under the two alternative policy regimes. Second, we estimate the model using data that covered the entire sample period (1960-2011) to evaluate the total effects. This time, we include a dummy variable (DUM) to test for the general impact of the policy changes on the level of real output in Nigeria. The DUM assigns 1 (DUM=1) for periods of deregulation (1986-2011) and 0 (DUM=0) for periods of regulation (1960-1985). Under the market mechanism, deregulation was expected to play a special role in realigning the fiscal, monetary, trade, pricing and exchange policies; and enhance productivity by freeing the economy from the distortions that might have arisen from excessive regulation. The DUM was, therefore, expected to relate positively with real output in line with the aspirations of the reforms.

A further verification of the results was carried out using the Chow Breakpoint test[2] on the data that covered the entire sample period to confirm the existence or otherwise of any significant difference in the estimated equation. The null hypothesis, therefore, is that there is no structural break in the real GDP series. In other words, the Chow Breakpoint test applies on the null hypothesis that the real output function remained the same before and after the implementation of SAP. This specification which includes both the autoregressive and trend components is as given below: H0: $\theta = \gamma = 0$ This third scenario excluded the DUM to prevent any biases that might arise from the influence of the dummy variable on the outcome of the Chow test. We make a final comparison of the three results in our empirical analysis.

The total effects estimated using data that covered the entire sample period would indicate the existence or otherwise of a significant long-run equilibrium relationship among the variables and provide the basis for our decision to either challenge or support the outward-oriented growth hypothesis as against the alternative protectionist paradigm. In other words, the results would offer empirical evidence as to whether trade barriers or controlled regimes had adversely affected the level of real output in Nigeria, and whether or not the ongoing liberalisation policies have the potentials to support the growth of the real sector. The estimations were done using E-views econometric software.

2 The classical test for structural change was developed by Chow (1960). The test-procedure splits the sample into two sub-periods and estimates the parameters for each of the sub-periods before testing for the equality of the two sets of parameters using the F statistic. The underlying assumption of the test is that the break date is known apriori (See Hansen 2001; Neeraj and Ambrish, 2005).

IV.2.1 Time Series Properties

The time series properties of the data were investigated to avoid the phenomenon of spurious regression when statistical inferences are drawn from non-stationary time-series. A variable was said to be stationary if it had no unit root. This meant that the mean, variance and auto-covariance of the series must be independent of time[3]. Thus, the absolute value of the test statistics must be greater than that of the critical value for the stationarity condition to be met. The level at which a non-stationary series becomes stationary after differencing defines the order of integration of the series[4]. We applied the Phillips-Perron (PP) test (1988) to verify the stationarity of the variables. Under the PP test, the null hypothesis about the existence of unit roots is tested against the alternative hypothesis that the series has no unit roots. Being a non-parametric test, the PP test was more robust and did not require a selected level of serial correlation like the Augmented Dickey Fuller (ADF) test, in addition to its ability to modify the Dickey Fuller (DF) test statistic to correct for any serial correlation and heteroscedasticity in the error term. Unlike the ADF tests, the PP tests were robust to general forms of heteroskedasticity in the error term and did not require a lag length to be specified for the test regression.

IV.2.2 The Johansen Cointegration Test

After determining the order of integration of the variables, we applied the Johansen (1988) and the Johansen and Juselius (1990) multivariate maximum likelihood method within a Vector Autoregressive (VAR) framework to verify the number of cointegrating equations in the Vector Error Correction Model (VECM)[5]. It is important to note that differencing variables to achieve stationarity leads to loss of long-run properties[6]. Cointegration, therefore, provides a remedy since it confirmed whether or not the deviations from the long-run path of two or more non-stationary variables that have a long-run relationship were stationary. The null hypothesis of the Johansen's method was that there were no more than r cointegrating relations. The test begins at r = 0 and accepts as r^ the first value of r for which the null hypothesis would be rejected (Pham and Nguyen, 2010). Johansen and Juselius (1990) provided two test statistics – the Maximum Eigenvalue Test (λmax) and Trace Test (λtrace) Statistics to determine the number of cointegrated vectors (r).

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3 A stochastic process is considered to be stationary if its mean and variance are constant over time and the value of the covariance between the two time-periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed (See Gujarati, 2004; Tunali, 2010).

4 A non-stationary time series can be made stationary by differencing or logging (Tunali, 2010).

5 The Johansen approach provides an alternative means or, more precisely, a simultaneous or systems approach of testing for the existence of unit roots in each variable when the null hypothesis is that of stationarity, rather than non-stationarity. Unit root test and cointegration techniques are, therefore, designed to deal with the spurious regression problem (See Nachega, 2001).

6 Bakare (2011) demonstrates how the Engel Granger's two-step procedure can be used to establish cointegration among variables.

disequilibrium[7]. We, therefore, allowed for a distinction between the long-and short-run behaviours in the economy by specifying an error-correction mechanism of real output toward its equilibrium level. For stationary time series, no distinction is required between the short and the long-run.

IV.2.4 Granger Causality Test

Cointegration provided no information about the direction of causality. The Engle-Granger (1987) test which is based on the error correction mechanism was, therefore, used to provide information about the direction of causality[8]. Examination of the short-run Granger causality is usually done by replacing yt and xt by their first differences $\triangle$yt and $\triangle$ xt provided that the (long-run) error correction term (ECT) was included in the equation lagged once. This ECT can be the estimated residual from a level regression of yt on xt lagged once. Another alternative was to use the Johansen's (1988) procedure to estimate the long-run coefficients and generate a long-run ECT.[9]

IV.3 Model Specification

Following from the theoretical literature, the functional form of the econometric model was specified as follows:

$$RGDPt = f(DOP_t, RER_t, RGNS_t, RCPS_t, RFDI_t, RIRS_t, CAPUT_t) \quad (4.1)$$

Where:
RGDP = Real gross domestic product
DOP = Degree of openness

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7 The deviations from equilibrium in the short-run are adjusted through equilibrium in the long-run. The coefficient of adjustment δ gives the speed of adjustment to the long-run equilibrium level. The estimated value of δ is expected to be negative and statistically significant. A statistically insignificant δ is an indication that disequilibrium will be sustained in the long-run. The Error Correction Mechanism (ECM) was first used by Sargan and later popularised by Engel and Granger. The *Granger representation theorem* states that if two variables Y and X are cointegrated, then the relationship between the two can be expressed as ECM (Gujarati, 2004); See Tunali (2010) for further exposition.

8 x_t is Granger causal of y_t if x_t helps predict y_t at some point in the future. Granger causality is not causality in the deep sense of the word. It just talks about linear prediction and only has "teeth" if one thing happens before another (i.e. in one direction). The definition of Granger causality made no mention of instantaneous correlation between the two variables. If the innovation to y_t and the innovation to x_t are correlated, then there is instantaneous causality. Since causality in the "real" sense can go either way, we usually do not test for instantaneous correlation. However, if we are able to find Granger causality in only one direction, we may feel the case for "real" causality is stronger if there is no instantaneous causality, because then the innovations to each series can be thought of as actually being generated from this particular series rather than part of some vector innovations to the vector system. We usually use the VAR approach to test for Granger causality if we have an econometric hypothesis of interest that states that x_t Granger causes y_t but y_t does not Granger cause x_t (See Sorensen, 2005).

9 In practice, arbitrary long-run coefficients have also been used to produce an estimate of the unknown long-run ECT (Dunne and Vougas, 1999); See Engel and Granger (1987) for theoretical details and Oxley (1993) for empirical exposition.

$$LRGDPt = \alpha + \beta_1 DOP_t + \beta_2 RER_t, + \beta_3 LRGNS_t + \beta_4 LRCPS_t + \beta_5 LRFDI_t + \beta_6 RIRS_t + \beta_7 CAPUT_t + \mu_t \quad (4.3)$$

Where:

α is the intercept term.

β_1 - β_7 capture the relative effects of the included regressors.

μ_t is the stochastic error term

Model (4.3) above was estimated to generate our residual series (ECM) and later used to test for the stationarity of the linear combination of the data series.

IV.4 Diagnostic Tests

We carried out single equation and system mis-specification tests to evaluate the statistical adequacy of the models under the relevant assumptions[10]. Durbin Watson Statistics was used to test for long-run residual autocorrelation; normality test (for skewness and excess kurtosis) was used to verify the distribution of the error term; the Autoregressive Conditional Heteroskedasticity (ARCH) test and the Ramsey's RESET test (Regression Specification Error Test) were applied to confirm the correctness of the model specification. The White Heteroscedasticity test (with no cross terms) was employed to ensure that the disturbances truly exhibit the equal variance (homoscedasticity) assumption. Weak exogeneity tests on the individual variables were also conducted under the assumption of one cointegrating vector in view of the limited length of our data and the risks associated with the possibility of insufficient degrees of freedom[11]. The Chow Test was further used to test for the structural stability of the model, while the Breusch-Godfrey Lagrange Multiplier (LM) test was employed to check for higher order serial correlation in the disturbances of the estimated short-run dynamic models.

V. Data Analysis and Discussion of Empirical Results

V.1 Descriptive Evidence

Table 1 summarises the descriptive statistics of the data employed in the study. The results show that the annual real GDP averaged ₦227.97 billion over the 1960-2011 period. Real interest rate spread averaged 7.6 per cent per annum. The average real private sector credit amounted to ₦20.03 billion compared to the real average gross national savings which stood at ₦12.56 billion. The descriptive evidence indicated that the degree of openness index had the lowest variability while the real GDP had the highest judging from the standard deviations recorded over the period.

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10 The Johansen approach is known to be robust even when the normality assumption is not satisfied. Read Nachega (2001), Gonzalo (1994) and Hubrich (1999) for clarifications.

11 See Nachega (2001) for empirical exposition.

Table 1: Descriptive Statistics on Selected Macroeconomic Variables (1960 – 2011)

Variables	Number of Observations	Mean	Standard Deviation
Real GDP (₦ million)	52	227,966.6	232,915.5
Real Exchange Rate (₦/US$1.00)	52	3.825343	3.193981
Real Interest Rate Spread (%)	52	7.589514	4.017179
Real Credit to the Private Sector (₦	52	20,025.08	25,029.79
Real Foreign Direct Investment (₦	52	2,959.803	3,124.994
Real Gross National Savings (₦	52	12,563.03	12,393.95
Manufacturing Capacity Utilisation	52	57.65242	17.20627
Degree of Openness (index)	52	0.473367	0.153894

Source: Author's Computation using E-views econometric software

Table 2 below presents the correlation matrix which provides evidence on the magnitude and direction of the relationship between each pair of variables. The correlation matrix was symmetric about the diagonal with values of 1.000000 indicating the perfect correlation of each variable with itself. The result indicated that all the variables expected to boost the level of real output in Nigeria possess the expected positive sign with the exception of manufacturing capacity utilization, which showed a negative relationship with the dependent variable. This may not be surprising given the huge energy constraints facing manufacturing enterprises in Nigeria and the resultant inability to enhance productivity by fully utilising their installed capacities. On the other hand, the real interest rate spread, which was expected to have negative relationship surprisingly shows positive correlation with the dependent variable. The strong positive correlations between the dependent variable and real credit to the private sector, real foreign direct investment and real gross national savings were understandable in view of their potentials to increase output levels in developing countries. The negative correlation with the real exchange rate was in line with *apriori* expectations and was also understandable given the over-reliance of the economy on imported inputs.

12 See Sodipe and Ogunrinola (2011).

Table 2: Pair-wise Correlation Matrix

	RGDP	RER	RIRS	RCPS	RFDI	RGNS	CAPUT	DOP
RGDP	1.000000	-0.595449	0.710561	0.849780	0.880911	0.834818	-0.529186	0.667314
RER	-0.595449	1.000000	-0.362142	-0.453957	-0.358537	-0.521319	0.617777	-0.548848
RIRS	0.710561	-0.362142	1.000000	0.529511	0.676476	0.473418	-0.429941	0.677984
RCPS	0.849780	-0.453957	0.529511	1.000000	0.821718	0.966450	-0.188257	0.426328
RFDI	0.880911	-0.358537	0.676476	0.821718	1.000000	0.793024	-0.295940	0.589807
RGNS	0.834818	-0.521319	0.473418	0.966450	0.793024	1.000000	-0.222673	0.393881
CAPUT	-0.529186	0.617777	-0.429941	-0.188257	-0.295940	-0.222673	1.000000	-0.563861
DOP	0.667314	-0.548848	0.677984	0.426328	0.589807	0.393881	-0.563861	1.000000

Source: Author's Computation using E-views econometric software

V.2 Results of Unit Root Tests

The results of the Phillips-Perron (PP) test did not reject the null hypothesis about the existence of unit roots at the level form of the data, thus, necessitating the differencing of the series. The results of the first differenced form of each of the series as reported in table 3 below, however, rejected the null hypothesis; implying that the series became stationary after their first difference. Therefore, each of the variables can be said to have a unit root, and all are integrated of the same order {I(1)}, thus meeting the precondition for the application of the Johansen (1988) and the Johansen and Juselius (1990) multivariate cointegration technique to determine the number of cointegrating vectors.

Table 3: Stationarity Test Analysis

Phillips-Perron (PP) TEST			
Variable	**Test Statistic**	**Critical Values**	**Order of Integration**
RGDP	-5.470943*	-3.568308	I (1)
DOP	-21.78126*	-3.568308	I (1)
RER	-5.791018*	-3.568308	I (1)
RGNS	-2.829142***	-2.598551	I (1)
RCPS	-4.406950*	-3.568308	I (1)
RFDI	-12.21839*	-3.568308	I (1)
CAPUT	-4.205148*	-3.568308	I (1)
RIRS	-13.14309*	-3.568308	I (1)

Note: *, **, *** indicate significance at 1%, 5% and 10% respectively. The lag lengths were automatically selected by E-views and all the test equations included intercept.

V.3 VAR Lag Order Selection

Considering the limited length of the data series, a maximum lag of 4 was permitted in the selection of the optimum lag length to be used in the estimation of the VAR model (Table 4). The Akaike Information Criterion (AIC), Hannan-Quinn information criterion (HQ) and the Schwartz Information Criterion (SC) were employed for the VAR lag order selection. The optimum lag order of one suggested by the SC criterion was selected because the estimation result, using lag 4 which most of the selection criteria seemed to suggest, could not satisfy the stability condition.

Table 4: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-417.1367	NA	0.053442	19.77380	20.10146	19.89463
1	-124.8714	462.1869	1.38e-06	9.156809	12.10580*	10.24430
2	-51.26593	89.01126	1.21e-06	8.710043	14.28035	10.76420
3	49.14397	84.06411*	5.83e-07	7.016559	15.20819	10.03738
4	223.1295	80.92350	4.78e-08*	1.900954*	12.71390	5.888436*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

V.4 Stability Test

The Autoregressive (AR) root stability test was used to verify the consistency or otherwise of the coefficients of the normalised cointegrating model as well as the short-run vector error correction model. The test result reported in table 5 below confirmed that the VAR system satisfied the stability condition since all the roots had modulus below one, implying that none of the roots fell outside the unit circle.

Table 5: Autoregressive (AR) Root Stability Test

Root	Modulus
0.989633	0.989633
0.930738 - 0.063762i	0.932919
0.930738 + 0.063762i	0.932919
0.737528 - 0.175810i	0.758193
0.737528 + 0.175810i	0.758193
0.695272	0.695272
0.266879	0.266879
-0.000267	0.000267

No root lies outside the unit circle.
VAR satisfies the stability condition.

V.5 Results of the Johansen's Test for Cointegration Vectors

From the results of the Johansen's cointegration test presented in Appendix I, both the standard trace and maximum eigenvalue test statistics indicated the existence of 1 cointegrating vector among DDOP, DRER, DLRGNS, DLRCPS, DLRFDI, DCAPUT, DRIRS and DLRGDP. These results asserted that the above variables were cointegrated with the logarithm of real output (DLRGDP). It was, thus, statistically proven that a long-run equilibrium relationship existed among the variables. The Johansen cointegration test used maximum lag order 1 along with constant trend specification. The Augmented Engle-Granger (AEG)'s two-step procedure was also used to verify the above result by applying the PP-test on the residuals generated from the long-run equations of the non-stationary variables to confirm the stationarity of the linear combination of the data series. The PP-test statistics confirm the stationarity of the residuals under the three different scenarios. Our parsimonious models were then estimated and the results presented in table 6 below.

V.6 Long-run Granger Causality Test

The long-run Granger-Causality test applied to the non-stationary level variables thereby ignoring the possibility of cointegration among the level variables. Dunne and Vougas (1999) emphasised the misspecification that might arise from the non-inclusion of the error correction term and the loss of long-run information that led to wrong inferences. Barring the above weaknesses, the result of the long-run Granger causality test showed that the real exchange rate, credit to the private sector and gross national savings are Granger causal of the level of real output in Nigeria while openness index, interest rate spread, foreign direct investment and manufacturing capacity utilisation were not (Appendix 3). The result showed strong evidence that the real exchange rate, credit to the private sector and gross national savings could help predict future levels of output.

V.7 Results of Diagnostic Tests for VAR Residuals[15]

The Breusch Godfrey Lagrange Multiplier (LM) test for both the pre- and post-reform time series did not reject the null hypothesis of no serial correlation, implying that the error terms are not serially correlated (see Appendixes V and VI). The Jarque-Bera tests rightly yielded insignificant probabilities with the skewness not significantly different from zero and kurtosis that nearly approximate the normal value of 3 (Appendix IV). With the skewness being of the highest importance for the Jarque-Bera normality test and validity of statistical inference, the residuals could, thus, be confirmed to be normally distributed as expected from the observed features of the estimated parameters.[16] The white heteroscedasticity tests (with no cross terms) confirmed that

13 Hendry and Juselius (2001) emphasised the critical importance of the properties of the VAR error term for the Johansen test for cointegration.

14 See Kitov, Kitov and Dolinskaya (2007) for further exposition.

the disturbances actually exhibited the equal variance (homoscedasticity) assumption as the tests did not reject the null hypothesis of homoscedasticity, implying that the error terms had constant variance (Appendices VII and VIII).

The Ramsey RESET test which followed the F-distribution, did not reject the null hypothesis that the models were well specified, implying that the estimated parsimonious real output models were free of specification errors (Appendices XI and XII). Even though the result of the pair-wise correlation matrix for the non-stationary level series reported in table 2 seemed to suggest the presence of multicollinearity between RCPS and RFDI; and RCPS and RGNS in view of their correlation coefficients that are in excess of 0.8, it could be confirmed that the relationship between them, under the Johansen's framework was non-linear, implying that multicollinearity could not be established among the regressors. Thus, the VAR model accurately describes the data and satisfies the principal statistical requirements that apply to the residuals. The VAR model stability was also guaranteed. The results of Wald Tests on the individual regressors all rejected the null hypothesis that the variables were weakly exogenous. This implied that the estimated coefficients were not nuisance parameters but were error-correcting (Appendix XIII).

V.8 Chow Test

Using the Chow Breakpoint test to verify whether there was any significant difference in the estimated equation, the empirical results obtained as seen from the F-statistic of the Chow Breakpoint test on the data covering the entire sample period rejected the null hypothesis that the real output function remained the same before and after structural reforms (Appendix II). This implies that the market-based incentives implemented during the SAP have had vital effects on the real output level in Nigeria.

V.9 Empirical Analysis

The long-run structure of the model was summarised in table 6 hereunder. The results of the OLS estimates of equation 4.3 at levels under the three different scenarios gave spurious regressions as earlier articulated in the methodological concepts, since all the variables were not time invariant at level (table 3). Though spurious, the long-run static models showed that credit to the private sector and capacity utilisation were consistent determinants of real productivity growth in both the pre-reform and market reform periods.

Table 6: The Long-Run Static Relationships

Variables, Constants	(A) Pre-Reform Results (1960-1985)	(B) Post-Reform Results (1987-2011)	(C) Pooled Regression Results (1960-2011)
C	6.659299 (1.375798)	9.414517* (18.20420)	4.394379* (3.452008)
DOP	3.725751 (0.945569)	0.410864 (1.598410)	0.560551 (0.729582)
RER	-0.127116 (-0.904488)	-0.098860** (-2.757192)	-0.144232* (-2.658013)
RIRS	-0.129055 (-1.471989)	0.012758*** (1.798287)	-0.001541 (-0.060703)
LRCPS	1.066248***(1.817126)	0.341243*** (1.956098)	1.271949* (4.737145)
LRFDI	-0.130246 (-0.458367)	0.038841 (0.594261)	0.071796 (0.527834)
LRGNS	-0.257247 (-0.513536)	-0.139623 (-0.798601)	-0.315893 (-1.094088)
CAPUT	-0.047875***(-1.911701)	0.019321* (4.380774)	-0.044359* (-8.579152)
R-squared	0.962543	0.955348	0.963136
Adjusted R-squared	0.947120	0.936962	0.957134
D-W Statistics	0.945776	1.202629	0.551306
F-Statistic	62.40773*	51.96061*	160.4911*

T statistic values are in parenthesis
**Significant at 1% level of Confidence*
***Significant at 5% level of Confidence*
****Significant at 10% level of Confidence*

The long-run regression results estimated using data covering the entire sample period suggested that the total effects of the variables on real output were significant but spurious with the Durbin-Watson (D.W.) statistics put at 0.551306. While the overall significance of the models were confirmed by the F-statistics, the long-run static models all showed negative first order serial correlation as evidenced by the D.W. statistics.

The estimation of the de-trended series using the general-to-specific methodology and subsequent elimination of the insignificant lags yielded the parsimonious models as reported in table 7. The empirical models for the short-run dynamics perform well both on statistical grounds and in terms of economic theory. Panel "D" of table 7 presented the results of the pre-reform period, during which the Nigerian economy was largely regulated. The results showed that changes in real output were positively related to the variations in real private sector credit and one period lag values of the dependent variable at the 1.0 per cent level of significance. The interest rate variable also conformed to *apriori* expectations as the result revealed a negative but significant relationship at the 1.0 per cent level, suggesting that the arbitrary fixing of interest rates by the monetary authorities during the pre-reform era actually discouraged investment and diminished real output in Nigeria. Ceteris paribus, if real interest rate spread widened by 1.0 per cent, real output would diminish by 0.3 per cent in the pre-SAP Nigeria. A 1.0 per cent increase in the previous level of output

would improve real income by 1.6 per cent in the regulation era, all things being equal. If real credit to the private sector increases by 1.0 per cent real national income would increase by 4.5 per cent.

The openness index, exchange rate variable and gross national savings were statistically insignificant and, thus, eliminated from the parsimonious model. The openness index was not expected to be significant during this period when domestic markets were widely regulated. The result further suggested that pegging exchange rates, as practiced during the period, was not an essential factor in the determination of real output. Foreign direct investment and manufacturing capacity utilisation were both significant but wrongly signed. This was not surprising as foreign direct investment hardly resulted in substantial diffusion of international technology to local industries. Even if the managerial and technological skills were readily absorbed, domestic industries would not deliver output when energy remained a major nightmare. The regulation era was equally marked by credit rationing and financial repression, thereby creating distortions that worsened the investment climate with adverse implications for capacity utilisation and output levels.

Table 7: The Short-Run Dynamic Relationships

Variables, Constants	(D) Pre-Reform Results (1962-1985)	(E) Post-Reform Results (1987-2011)	(F) Pooled Regression Results (1963-2011)
C	7.939716* (30.69406)	0.035150* (3.771259)	-0.011053 (-0.327545)
DLRGDP(-1)	1.609595* (2.841466)	0.367670** (2.488338)	0.388693* (2.777570)
DRIRS	-0.346339* (-2829974)	RVP	RVP
DRIRS(-1)	RVP	-0.004649** (-2.218281)	RVP
DRER	RVP	-0.042065* (-3771385)	-0.132081* (-3.007568)
DLRCPS	4.467433* (2.839113)	0.054352 (1.449083)	RVP
DLRCPS(-1)	RVP	RVP	-0.574938* (-3.462720)
DLRFDI	-1.189568** (-2.401335)	RVP	0.004597 (0.089339)
DLRFDI(-2)	RVP	-0.034790* (-3.050211)	0.055978 (1.161916)
DCAPUT	-0.227359* (-3.364832)	0.008233* (4.368278)	RVP
DCAPUT(-1)	-0.272384* (-4.363016)	RVP	0.012280 (1.611004)
DDOP(-1)	RVP	-0.116016** (-2.218035)	0.251206 (1.030466)
DLRGNS	RVP	RVP	0.573360* (3.827031)
ECM1(-1)	-0.298385*** (-0.845396)	na	na
DUM	na	na	0.322357***(1.786992)
ECM2(-1)	na	-0.277544** (-2.634846)	na
ECM(-1)	na	na	-0.210250* (-2.790876)
R-squared	0.885068	0.731846	0.553939
Adjusted R-squared	0.827602	0.597768	0.360645
D-W Statistics	1.612643	2.179037	1.945037
F-Statistic	15.40161*	5.458389*	2.865793*

T statistic values are in parenthesis RVP = *Redundant Variable eliminated from Parsimonious Model* *Significant *at 1% level of Confidence* *na = Not applicable in the model*
***Significant at 5% level of Confidence*
****Significant at 10% level of Confidence*

Source: *Author's Computation*

At 0.83, the value of the adjusted R-squared for the estimated equation was high showing that 83.0 per cent of the systematic variations in real output over the observed period was explained by the included explanatory variables while the balance of 17.0 per cent was explained by other determinants outside the model. The estimated coefficient of the lag error correction term ECM1(-1) was found to be statistically significant and correctly signed, implying that long-run equilibrium was attainable as the shocks generated by the exogenous factors can be corrected to restore equilibrium.

Panel "E" of table 7 presented the results of the post-SAP era during which Nigeria dismantled existing regulatory structures to allow for the free interplay of market forces. The results showed that all the variables except credit to the private sector and gross national savings exert significant influence on real output level. This implied that the post-SAP performance of financial intermediaries in terms of savings mobilisation and funding of the private sector did not meaningfully support the real sector. This finding was in conformity with the conclusion by Ayadi, Adegbite and Ayadi (2008) that the performance of financial intermediaries in the SAP period in terms of credit to the private sector did not surpass the pre-SAP level".

It was also evident that the interest rate sensitivity of output has drastically weakened in the post-SAP period given the drop in short-run interest elasticity of income from 0.35 to a lag response of 0.005, implying that if the difference between the lags of real maximum lending and real consolidated deposit rates widens by 1.0 per cent, real output would decrease by 0.005 per cent. It was also interesting to note that the exchange rate variable, which was insignificant in the pre-SAP era emerged a significant output determinant under the deregulation regime as the result showed that 1.0 per cent depreciation in the national currency (in real terms) reduces real output by 0.04 per cent. This finding was consistent with Bakare's (2011) statement that "the exchange rate policy of Nigeria's Structural Adjustment Programme may have contributed negatively to the level of real output in Nigeria".

It was equally instructive to note that the one period lag of the openness index this time was significant but wrongly signed implying that trade openness had adverse effects on the real sector of the Nigerian economy. This finding was somewhat similar to the conclusions by Iganiga (2010) and Bakare (2011) to the extent that the coefficients of the key indicators of economic reforms both turned out to be negative, suggesting that the structural change was unable to deliver the desired levels of output. Unlike in the pre-SAP era, manufacturing capacity Utilisation in the deregulation period made a positive impact on the real sector, but albeit a very weak contribution of 0.008 per cent owing to the same reasons earlier articulated. The coefficient of foreign direct

investment though consistent in its relationship with real output also suggests a waning magnitude from the contemporaneous 1.19 per cent impact in the pre-SAP period to a 0.03 per cent lag effect in the post-SAP period. The value of the adjusted R-squared though still high actually declined from 82 to 60 per cent, implying that the explanatory power of the included regressors faded by 22 per cent after the introduction of market reforms. The estimated coefficient of the lag error correction term (ECM) was also found to be statistically significant and correctly signed, implying that long-run equilibrium is attainable as the shocks generated by the exogenous factors can be corrected.

Panel "F" of table 7 showed the regression results obtained when we utilised data that covered the entire sample period. The result showed that the policy changes that attended the implementation of the SAP had some weakly significant positive effects on the level of real output in Nigeria as the deregulation dummy (DUM) passed the test of statistical significance at the 10 per cent level. The result indicated that real gross national savings has positive overall influence on the level of real output despite its redundant effects in the sub-samples. This finding was, again, not surprising in view of the usual accumulation of savings in the informal sector, which the mainstream financial system hardly accounts for, but might exert some significant influence on the level of real output. Perhaps, the accumulated savings in the shadow economy were not sufficient for their impacts to be felt over a short period, making them to be redundant in the sub-samples. The one period lagged dependent variable, however, emerged stronger in affecting real output and it was correctly signed. The real exchange rate variable was found to be consistent in sign and exhibited a stronger impact on the level of real output. The result also indicated that credit to the private sector has significant but negative lag effects on real output. However, manufacturing capacity utilisation, degree of openness and foreign direct investment were found to be insignificant in influencing the overall level of real output, partly due to the reasons earlier explained.

VI. Conclusion and Policy Recommendations

The paper explored the impact of structural reforms on real productivity growth in Nigeria using system cointegration analysis and error correction modeling. It highlighted the relationships between real output growth and some important indicator variables thought to capture the average behaviours during the period. Results of the parsimonious output models provide useful insights into the real income determination process in Nigeria. The Chow Breakpoint test on the data covering the entire sample period rejected the null hypothesis that the real output function remained the same before and after structural reforms, implying that the market-

based incentives implemented during the SAP had vital effects on the real output level in Nigeria. While the deregulation dummy (DUM) indicated that structural changes had positive effects on the level of real output, sub-sample evidence suggested that the overall impact was mixed. In particular, manufacturing capacity utilisation was discovered to play an essential role in enhancing productivity in Nigeria. This implied that addressing critical infrastructural problems like epileptic power supply and poor transport/communication networks with the goal of promoting manufacturing capacity utilisation is a sure way to enhancing productivity in the economy. The result also indicated that real gross national savings has positive overall influence on the level of real output despite its redundant effects in the sub-samples. This implied that savings mobilisation would actually play a major role in growing the Nigerian economy. The monetary authorities should, therefore, endeavour to integrate the large underground economy into the mainstream financial sector to improve financial intermediation and mobilise more savings.

The paper also suggested that credit market liberalisation in Nigeria did not achieve the purpose of improving allocation efficiency, as real private sector credit was found to impact negatively on the level of productivity in the post-SAP period. This was not surprising given the incompatibility of banks' lending behaviour with the long-term investment drive of private businesses. It was a known fact that most banks preferred to lend short-term in order to satisfy urgent liquidity needs in addition to ensuring the security of capital. Banks also preferred to trade in the foreign exchange market for better and quicker returns than lend to the private sector. Their lending behaviour was, thus, at variance with the country's growth and development goals. It was, therefore, advisable that government design suitable mechanisms to channel investment credit to the private sector if the nation's dream of emerging among the 20 largest economies by the year 2020 is to be achieved.

Furthermore, administered interest rates and exchange rate pegs were found to be counter-productive. This suggested that financial liberalisation might be a better alternative for hoisting productivity in Nigeria. But, flexible exchange rates and interest rates liberalisation were also found to have dampened the level of output in the post-SAP period. This again was not surprising given the upward pressures on interest and exchange rates in the aftermath of SAP and the attendant effects on macroeconomic stability. Since it was evident that the price system cannot guarantee the desired moderation in interest rates, the monetary authorities need to take extra measures to reduce interest rates in different segments of the market. Government can also play complementary roles by limiting the size of budget deficits to cut down on huge domestic borrowing, which is now in trillions of naira. This would

not only improve investment but also go a long way to free additional credit for focused lending to the private sector towards enhancing the level of output. The present stability in the foreign exchange market also needed to be sustained to forestall any further depreciation in the naira exchange rate. Above all, more stable sources of foreign exchange needed to be urgently sought if the monetary authorities are to meet the ever increasing demand for foreign exchange to stabilise rates in the market.

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Appendix I: the Johansen's Test for Cointegration Vectors

Exogenous series: DDOP DRER DLRGNS DLRCPS DLRFDI DCAPUT DRIRS
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.595858	42.58152	3.841466	0.0000

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesised No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.595858	42.58152	3.841466	0.0000

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalised by b'*S11*b=I):

DLRGDP
4.996171

Unrestricted Adjustment Coefficients (alpha):

D(DLRGDP)	-0.186878

Appendix II: Chow Breakpoint Test

Chow Breakpoint Test: 1986			
F-statistic	9.727149	Prob. F(13,18)	0.000012
Log likelihood ratio	91.63361	Prob. Chi-Square(13)	0.000000

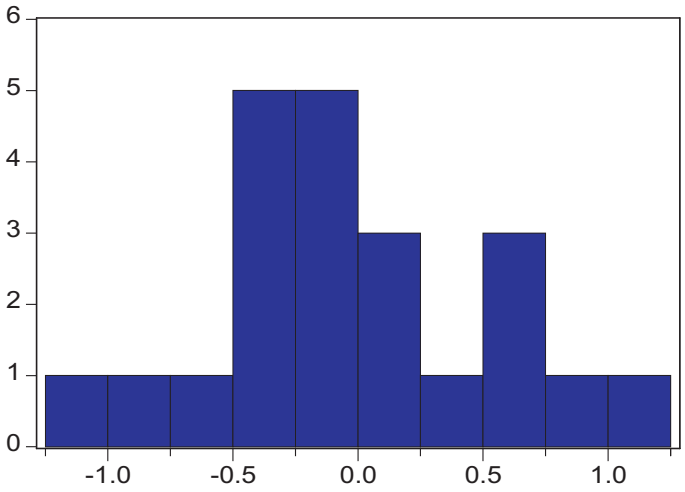
Appendix III: Long-run Granger Causality Tests

Pairwise Granger Causality Tests
Date: 06/27/12 Time: 09:50
Sample: 1960 2011
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability	Decision Rule
DOP does not Granger Cause LRGDP	51	0.36307	0.54964	Do Not Reject H_0
LRGDP does not Granger Cause DOP		6.56141	0.01362	Reject H_0
RER does not Granger Cause LRGDP	51	7.55309	0.00842	Reject H_0
LRGDP does not Granger Cause RER		0.44778	0.50660	Do Not Reject H_0
RIRS does not Granger Cause LRGDP	51	0.02658	0.87117	Do Not Reject H_0
LRGDP does not Granger Cause RIRS		5.08468	0.02874	Reject H_0
LRCPS does not Granger Cause LRGDP	51	4.20943	0.04568	Reject H_0
LRGDP does not Granger Cause LRCPS		0.63911	0.42797	Do Not Reject H_0
LRFDI does not Granger Cause LRGDP	49	1.23971	0.27131	Do Not Reject H_0
LRGDP does not Granger Cause LRFDI		1.95001	0.16929	Do Not Reject H_0
LRGNS does not Granger Cause LRGDP	51	5.72560	0.02068	Reject H_0
LRGDP does not Granger Cause LRGNS		0.02532	0.87424	Do Not Reject H_0
CAPUT does not Granger Cause LRGDP	51	0.86747	0.35632	Do Not Reject H_0
LRGDP does not Granger Cause CAPUT		3.09062	0.08512	Reject H_0

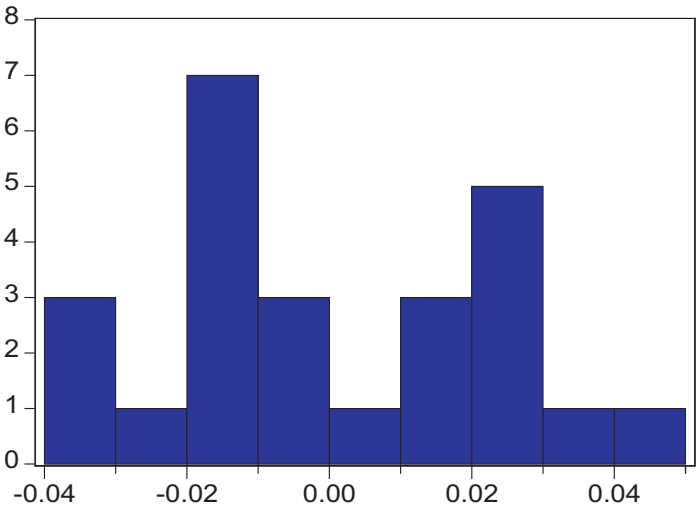
Appendix IV: Test of Normality

(Pre-SAP)



Series: Residuals	
Sample 1962 1985	
Observations 22	
Mean	6.01e-16
Median	-0.062924
Maximum	1.042557
Minimum	-1.223174
Std. Dev.	0.548340
Skewness	0.027347
Kurtosis	2.841164
Jarque-Bera	0.025869
Probability	0.987149

(Post-SAP)



Series: Residuals	
Sample 1987 2011	
Observations 25	
Mean	5.00e-18
Median	-0.006248
Maximum	0.046472
Minimum	-0.034568
Std. Dev.	0.023272
Skewness	0.264395
Kurtosis	1.831588
Jarque-Bera	1.713339
Probability	0.424574

Appendix V: Serial Correlation LM Test (Pre-SAP)

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.040773	Prob. F(2,12)	0.960180
Obs*R-squared	0.148491	Prob. Chi-Square(2)	0.928444

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/27/12 Time: 15:56
Sample: 1962 1985
Included observations: 22
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.041868	0.336920	0.124267	0.9032
DLRGDP(-1)	0.012981	0.622871	0.020840	0.9837
DRIRS	0.022740	0.154387	0.147295	0.8853
DLRCPS	-0.284280	2.030957	-0.139973	0.8910
DLRFDI	0.087723	0.683384	0.128366	0.9000
DCAPUT	0.008214	0.078412	0.104751	0.9183
DCAPUT(-1)	0.000613	0.070191	0.008729	0.9932
ECM1(-1)	0.083914	0.889765	0.094310	0.9264
RESID(-1)	0.112946	0.395527	0.285559	0.7801
RESID(-2)	0.018455	0.424191	0.043507	0.9660

R-squared	0.006750	Mean dependent var	6.01E-16
Adjusted R-squared	-0.738188	S.D. dependent var	0.548340
S.E. of regression	0.722933	Akaike info criterion	2.491956
Sum squared resid	6.271593	Schwarz criterion	2.987884
Log likelihood	-17.41152	F-statistic	0.009061
Durbin-Watson stat	1.718329	Prob(F-statistic)	1.000000

Appendix VI: Serial Correlation LM Test (Post-SAP)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.313525	Prob. F(2,14)	0.735867
Obs*R-squared	1.071730	Prob. Chi-Square(2)	0.585163

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/27/12 Time: 16:01
Sample: 1987 2011
Included observations: 25
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.003019	0.012357	-0.244285	0.8106
DLRGDP(-1)	0.048402	0.188030	0.257416	0.8006
DRIRS(-1)	0.001029	0.002569	0.400421	0.6949
DRER	0.002282	0.012037	0.189610	0.8523
DLRFDI(-2)	0.000416	0.012139	0.034255	0.9732
DCAPUT	-8.65E-05	0.002089	-0.041432	0.9675
DDOP(-1)	0.009485	0.062978	0.150613	0.8824
ECM2(-1)	0.040348	0.121408	0.332333	0.7446
DLRCPS	-0.004047	0.041023	-0.098642	0.9228
RESID(-1)	-0.198075	0.381919	-0.518632	0.6121
RESID(-2)	0.154598	0.369926	0.417916	0.6823

R-squared	0.042869	Mean dependent var	5.00E-18
Adjusted R-squared	-0.640796	S.D. dependent var	0.023272
S.E. of regression	0.029810	Akaike info criterion	-3.887797
Sum squared resid	0.012441	Schwarz criterion	-3.351491
Log likelihood	59.59746	F-statistic	0.062705
Durbin-Watson stat	1.834976	Prob(F-statistic)	0.999946

Appendix VII: White Heteroskedasticity Test (Pre-SAP)

White Heteroskedasticity Test:

F-statistic	1.721791	Prob. F(14,7)	0.239287
Obs*R-squared	17.04904	Prob. Chi-Square(14)	0.253574

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/27/12 Time: 16:05
Sample: 1962 1985
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.127379	0.160962	0.791362	0.4547
DLRGDP(-1)	-2.045578	0.909753	-2.248499	0.0593
DLRGDP(-1)^2	0.735750	0.631413	1.165244	0.2821
DRIRS	-0.090971	0.095205	-0.955529	0.3711
DRIRS^2	-0.005938	0.026962	-0.220250	0.8320
DLRCPS	0.578891	1.460050	0.396487	0.7036
DLRCPS^2	13.69877	7.276858	1.882512	0.1018
DLRFDI	-0.917748	0.326194	-2.813507	0.0260
DLRFDI^2	-0.546753	0.527972	-1.035571	0.3348
DCAPUT	-0.192662	0.141899	-1.357742	0.2167
DCAPUT^2	-0.020246	0.011545	-1.753642	0.1229
DCAPUT(-1)	0.011564	0.096990	0.119231	0.9084
DCAPUT(-1)^2	-0.003790	0.006695	-0.566130	0.5890
ECM1(-1)	0.880059	0.536368	1.640776	0.1448
ECM1(-1)^2	0.546413	1.320308	0.413852	0.6914

R-squared	0.774956	Mean dependent var	0.287010
Adjusted R-squared	0.324869	S.D. dependent var	0.398607
S.E. of regression	0.327521	Akaike info criterion	0.823972
Sum squared resid	0.750888	Schwarz criterion	1.567864
Log likelihood	5.936309	F-statistic	1.721791
Durbin-Watson stat	2.266457	Prob(F-statistic)	0.239287

Appendix VIII: White Heteroskedasticity Test (Post-SAP)

White Heteroskedasticity Test:

F-statistic	1.075214	Prob. F(16,8)	0.481438
Obs*R-squared	17.06457	Prob. Chi-Square(16)	0.381431

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/27/12 Time: 16:04
Sample: 1987 2011
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000324	0.000377	-0.858936	0.4154
DLRGDP(-1)	0.018319	0.007939	2.307637	0.0499
DLRGDP(-1)^2	-0.080142	0.046403	-1.727098	0.1224
DRIRS(-1)	1.91E-05	4.94E-05	0.386213	0.7094
DRIRS(-1)^2	-3.29E-07	7.89E-06	-0.041725	0.9677
DRER	-0.000292	0.000479	-0.608360	0.5598
DRER^2	5.83E-05	0.000188	0.310146	0.7644
DLRFDI(-2)	-0.000624	0.000343	-1.819298	0.1064
DLRFDI(-2)^2	0.000359	0.000307	1.170198	0.2756
DCAPUT	3.02E-05	7.05E-05	0.427936	0.6800
DCAPUT^2	1.47E-06	6.59E-06	0.223331	0.8289
DDOP(-1)	-0.001805	0.001469	-1.228736	0.2541
DDOP(-1)^2	0.002374	0.003138	0.756610	0.4710
ECM2(-1)	-0.002356	0.001968	-1.196686	0.2657
ECM2(-1)^2	0.012501	0.010647	1.174192	0.2741
DLRCPS	0.000340	0.000985	0.345182	0.7389
DLRCPS^2	-0.000610	0.002274	-0.268212	0.7953

R-squared	0.682583	Mean dependent var	0.000520
Adjusted R-squared	0.047748	S.D. dependent var	0.000484
S.E. of regression	0.000472	Akaike info criterion	-12.25780
Sum squared resid	1.78E-06	Schwarz criterion	-11.42896
Log likelihood	170.2224	F-statistic	1.075214
Durbin-Watson stat	1.977818	Prob(F-statistic)	0.481438

Appendix IX: Autoregressive Conditional Heteroskedasticity (ARCH) Test (Pre-SAP)

ARCH LM Test:			
F-statistic	0.165177	Prob. F(1,18)	0.689225
Obs*R-squared	0.181862	Prob. Chi-Square(1)	0.669778

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1963 1985
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.220670	0.084905	2.599015	0.0181
RESID^2(-1)	0.070052	0.172364	0.406420	0.6892

R-squared	0.009093	Mean dependent var	0.240507
Adjusted R-squared	-0.045957	S.D. dependent var	0.303788
S.E. of regression	0.310690	Akaike info criterion	0.594597
Sum squared resid	1.737508	Schwarz criterion	0.694170
Log likelihood	-3.945968	F-statistic	0.165177
Durbin-Watson stat	1.702348	Prob(F-statistic)	0.689225

Appendix (X): Autoregressive Conditional Heteroskedasticity (ARCH) Test (Post-SAP)

ARCH LM Test:

F-statistic	0.269200	Prob. F(1,22)	0.609049
Obs*R-squared	0.290122	Prob. Chi-Square(1)	0.590142

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1988 2011
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000477	0.000148	3.220970	0.0039
RESID^2(-1)	0.109453	0.210955	0.518844	0.6090

R-squared	0.012088	Mean dependent var	0.000533
Adjusted R-squared	-0.032817	S.D. dependent var	0.000490
S.E. of regression	0.000498	Akaike info criterion	-12.29309
Sum squared resid	5.45E-06	Schwarz criterion	-12.19492
Log likelihood	149.5171	F-statistic	0.269200
Durbin-Watson stat	1.935802	Prob(F-statistic)	0.609049

Appendix (XI): Ramsey RESET Test (Pre-SAP)

Ramsey RESET Test:

F-statistic	0.864459	Prob. F(1,13)	0.369438
Log likelihood ratio	1.416344	Prob. Chi-Square(1)	0.234006

Test Equation:
Dependent Variable: LRGDP
Method: Least Squares
Sample: 1962 1985
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.121000	14.04977	-0.364490	0.7214
DLRGDP(-1)	-4.904866	7.029670	-0.697738	0.4976
DRIRS	0.985870	1.438117	0.685529	0.5051
DLRCPS	-10.36174	16.02761	-0.646493	0.5292
DLRFDI	2.780054	4.298422	0.646762	0.5290
DCAPUT	0.728273	1.030063	0.707017	0.4920
DCAPUT(-1)	0.777825	1.131286	0.687558	0.5038
ECM1(-1)	3.409062	5.112189	0.666850	0.5165
FITTED^2	0.206101	0.221671	0.929763	0.3694

R-squared	0.892234	Mean dependent var	9.422163
Adjusted R-squared	0.825917	S.D. dependent var	1.617446
S.E. of regression	0.674851	Akaike info criterion	2.343440
Sum squared resid	5.920516	Schwarz criterion	2.789776
Log likelihood	-16.77784	F-statistic	13.45400
Durbin-Watson stat	1.413842	Prob(F-statistic)	0.000039

Appendix (XII): Ramsey RESET Test (Post-SAP)

Ramsey RESET Test:

F-statistic	0.019265	Prob. F(1,15)	0.891457
Log likelihood ratio	0.032087	Prob. Chi-Square(1)	0.857836

Test Equation:
Dependent Variable: DLRGDP
Method: Least Squares
Sample: 1987 2011
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.036021	0.011486	3.136139	0.0068
DLRGDP(-1)	0.400020	0.278535	1.436158	0.1715
DRIRS(-1)	-0.005018	0.003433	-1.462034	0.1644
DRER	-0.045116	0.024812	-1.818329	0.0890
DLRFDI(-2)	-0.037781	0.024559	-1.538366	0.1448
DCAPUT	0.009043	0.006156	1.469046	0.1625
DDOP(-1)	-0.126804	0.094632	-1.339966	0.2002
ECM2(-1)	-0.295454	0.168736	-1.750981	0.1004
DLRCPS	0.056606	0.041982	1.348354	0.1976
FITTED^2	-0.571966	4.120868	-0.138797	0.8915

R-squared	0.732190	Mean dependent var	0.055913
Adjusted R-squared	0.571503	S.D. dependent var	0.044940
S.E. of regression	0.029418	Akaike info criterion	-3.925265
Sum squared resid	0.012981	Schwarz criterion	-3.437715
Log likelihood	59.06581	F-statistic	4.556640
Durbin-Watson stat	2.220153	Prob(F-statistic)	0.004896

Appendix XIII: Weak Exogeneity Test[15]

Weak Exogeneity Test Statistics

Variable	Exogeneity test	Chi-Square (1)
	Pre-Reform	
dlrgdp (-1)	a dlrgdp (-1) = 0	8.1*
drirs	a drirs = 0	8.0*
dlrcps	a dlrcps = 0	8.1*
dlrfdi	a dlrfdi = 0	5.8**
dcaput	a dcaput	11.3*
dcaput (-1)	a dcaput (-1) = 0	19.0*
	Post - Reform	
dlrgdp (-1)	ßdlrgdp(-1) = 0	6.2*
drirs (-1)	ßdrirs (-1) = 0	4.9**
drer	ßdrer = 0	14.2*
dlrfdi (-2)	ßdlrfdi (-2) = 0	9.3*
dcaput	ßdcaput = 0	19.1*
ddop (-1)	ßddop (-1) = 0	4.9**
	Pool Regression	
dlrgdp (-1)	δ dlrgdp (-1) = 0	7.7*
drer	δ drer = 0	9.0*
dlrgns	δ dlrgns = 0	14.6*
dlrcps (-1)	δ dlrcps (-1) = 0	12.0*
dum	δ ddum = 0	3.2**

** and ** denote rejection at 1 and 5 per cent critical values, respectively.*

15 Conducted under the assumption of one cointegrating vector

Effect of Deposit Money Banks' Credit on the Performance of Micro, Small and Medium Enterprises in Nigeria

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Abstract

This paper set out to empirically evaluate the effect of deposit money banks' credit on the performance of MSMEs in Nigeria, with the aid of a vector autoregression and error correction mechanism (ECM) technique. Results of the empirical investigation confirmed credit had a positive effect on GDP of MSMEs in Nigeria as the coefficient of CAM (credit to MSMEs) was positive (1.0569) and significant at 1.0 per cent level. It was, therefore, recommended that every effort should be made to improve access to credit by MSMEs, so that they could play their potential roles of employment generation and wealth creation and move the majority of the entrepreneurs out of poverty.

Keywords: Micro, small and medium enterprises, Financing, Credit, Economic development.

JEL Classification Numbers: G21, C51, N80, O16.
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I. Introduction

Economic growth is a process whereby an economy's real national income or output increases over a long period of time. Economic development, however, refers to higher levels of real national income and improved conditions of living for the people. Maintaining development is a problem for rich countries, but accelerating development is an even more pressing matter for poor countries (Ojo, 2010). The role of finance in economic growth and development is widely acknowledged in literature. It is argued that financial intermediation through the banking system play a pivotal role in economic development by affecting the allocation of savings, thereby improving productivity, technical change and the rate of economic growth (Sanusi, 2011).

For both developing and developed countries, micro, small and medium scale firms play important roles in the process of industrialisation and economic growth. Apart from increasing income and output, MSMEs create employment opportunities,

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enhance regional economic balance through industrial dispersal and generally promote effective resource utilisation considered critical to engineering economic development and growth (Sule, 1986 and Udechukwu, 2003). Micro, small and medium enterprises (MSMEs) are companies whose headcount or turnover falls below certain limits. The definitions change over time and depend, to a large extent, on a country's level of development. Thus, what is considered small in a developed country like the USA could actually be classified as large in a developing country like Nigeria. However, the definition of MSMEs in Nigeria as contained in the National Policy on Micro, Small and Medium Enterprises (SMEDAN, 2007) was adopted as indicated in Table 1. This was also in line with the definition in some developing countries like Indonesia (Timberg, 2000) as well as in the European Union (EU) (European Commission, 2007).

Table 1: Classification of MSMEs in Nigeria

S/N	Size Category	Employment	Assets (₦'million) (excluding land and buildings)
1.	Micro enterprises	Less than 10	Less than 5
2.	Small enterprises	10 -49	5 to less than 50
3.	Medium enterprises	50 -199	50 – less than 500

Source: Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), Abuja, 2007.

The National Policy document states that, where there exist a conflict in classification between employment and assets criteria (for example, if an enterprise has assets worth ₦7.0 million but employs 7 persons, the employment-based classification will take precedence and the enterprise would be regarded as micro (SMEDAN, 2007). This is because employment-based classification tends to be relatively more stable definition, given that inflationary pressures may compromise the asset-based definition.

In Nigeria, incidence of poverty is still very high. According to the World Bank, in 2010, 68 per cent of total Nigerian population was said to be living on less than $1.25 per day compared with 18.1 per cent in Indonesia. In the same vein, per capita income has not fared better. It was as low as US$1,180 in 2010 compared with US$2,500 in Indonesia (World Bank, 2012). The reason for evolving several credit schemes in the past was to accelerate economic development in the country through the MSMEs. Since the MSMEs represent over 90.0 per cent of the agricultural and industrial sectors in terms of the number of enterprises, and account for about 50.0 per cent of Nigeria's GDP

together with the MSMEs in the other sectors of the economy. The acceleration of their growth and development would certainly have a positive spillover effect on the whole economy. This has not been the case because of their lack of access to adequate finance.

Credit-constrained groups, namely, micro, small and medium enterprises traditionally risk-appraised by lenders as the "lower end" of the credit market often face discrimination from formal credit purveyors resulting in stringent credit rationing and high risk-premium charges, even if they secure credit. The repressive circumstance derive from their incapacity to pledge the traditional favoured securities such as; mortgages, land, sterling shares or other "gilt-edges" to back up credit proposals (CBN/CeRAM, 2007). This is why specialised financing schemes and funds have been evolved over the years in Nigeria like in other developing countries.

While financing is obviously not the only problem militating against the MSME sector, it is certainly the most critical. Unlike other investments in the real sector of the economy, investment in MSMEs is relatively huge due to the need for fixed assets such as land, civil works, buildings, machinery and equipment and movable assets. Moreover, empirical studies (Udechukwu, 2003), show that the incidence of the extra outlays required to compensate for deficiencies in the supply of basic utilities is relatively heavier on MSMEs than large enterprises. While such extra investments have been shown to account for about 10.0 per cent of the cost of machinery and equipment of large enterprises, they represent about 20.0 to 30.0 per cent of that of MSMEs because of the absence of economies of scale.

Furthermore, due to the long gestation period of MSME investments in the real sector compared with trading activities, and other ancillary reasons, MSMEs have suffered bias by deposit money banks (DMBs), which prefer to pay penalty rather than meet up the 20.0 per cent target lending to small-scale enterprises (SSEs) following the then CBN credit guidelines in the direct monetary policy regime (CBN, 1995). This resulted in a drastic decline of SSEs lending after the abolition of the sectoral allocation in 1996 (CBN, 2009).

Statistics from the CBN also revealed that commercial banks' loans to SSEs as a ratio of total credit declined from 48.8 per cent in 1992 to 17.0 per cent in 1997, just one year after the abolition of the guidelines. By 2009, SSEs share of commercial banks' total credit portfolio was a paltry 0.17 per cent. Similarly, the ratio of SSEs loans to merchant

banks' total credit before the granting of universal banking license to DMBs in 2000/2001 declined from 31.2 per cent in 1992 to 9.0 per cent in 2000. According to Anyanwu (2003), the technical committee for the establishment of a national credit guarantee scheme for SMEs in its analysis, established that not more than 50.0 per cent of aggregate effective demand for investment loans in the manufacturing sector were being met. This, therefore, necessitates further action aimed at enhancing the flow of financial resources to the MSMEs.

In Nigeria, after several years of debt (credit) financing, inadequate capital is still believed to be a major inhibiting factor for new and growing MSMEs. Specifically, it is argued that inadequate equity capital creates the need for debt financing which the MSMEs are ill-equipped to attract; and determines or influences their initial decisions concerning the acquisition of fixed assets, working capital requirements and even location (Owualah, 2002).

To alleviate the shortcomings of the past schemes towards the financing of MSMEs in Nigeria, the Small and Medium Enterprises Equity Investment Scheme (SMEEIS) was conceived and put into operation from August 2001, with emphasis on banks providing equity financing rather than debt. From inception in 2001 to end-December 2008, the cumulative sum set aside by banks under the SMEEIS was ₦42.0 billion. The sum of ₦28.2 billion or 67.1 per cent of the sum was invested in 333 projects, out of which the real sector accounted for 205 projects, and the service-related sector, excluding trading, accounted for 128 projects (CBN, 2007a). By the third quarter of 2008, the Bankers Committee took the decision that participation under SMEEIS be optional. After almost five decades of tinkering with various financing schemes for the MSMEs, it has become pertinent to carry out an empirical study on the effect of these funding initiatives on the performance of the MSMEs in Nigeria. Therefore, the objective of this paper is to examine the effect of DMBs credit on the performance of MSMEs in Nigeria. Following this introduction, Part II examined the theory, conceptual framework and literature review. Part III discussed the methodology and the models adopted. Part IV contained the analysis of result while Part V concluded the paper.

II. Theory, Conceptual Framework and Literature Review

II.1 Theory and Conceptual Framework

The financial system plays a fundamental role in the growth and development of an economy, particularly by serving as the fulcrum for financial intermediation between the surplus and deficit units in the economy. For many years, theoretical discussions

about the importance of credit development and the role that financial intermediaries play in economic growth have occupied a key position in the literature of development finance. Shaw (1973), stated that financial or credit development can foster economic growth by raising savings, improving efficiency of loan-able funds and promoting capital accumulation. Following the adoption of the Universal Banking System in Nigeria in January 2001, the dichotomy between the erstwhile commercial and merchant banks was removed, thus paving the way for banks to effectively play their intermediation role and provide level playing ground for operators in the banking industry. Consequently, the banks were able to pursue the business of receiving deposits, and the provision of finance, consultancy and advisory services unhindered (CBN, 2007b).

Economic growth is the increase in value of the goods and services produced by an economy. It is conventionally measured as the rate of increase in real gross domestic product (GDP). Some economists have defined it as an increase in GDP per capita. Economic growth shifts society's production possibility frontier up and to the right. The production possibility frontier shows all possible combinations of output that can be produced in a society, if all of the scarce resources are fully and efficiently employed (Fapohunda, 2000).

The role of financial institutions in the accumulation of savings and provision of credits for investment through their intermediation processes is widely documented and acknowledged (Saunders and Cornett, 2009). These institutions mobilise funds from surplus areas and channel them to deficit units, thereby allocating the funds efficiently for investment purpose. Banks are the most important example of a class of institutions called financial intermediaries, firms that extend credit to borrowers using funds raised from savers (CBN, 2007b). Other examples of financial intermediaries are savings and loans association and credit unions (CBN/World Bank, 1999). However, credit is not an end in itself; it is a means to an end. The ultimate goal is to affect productivity. Thus, a successful economy not only saves, but also uses its savings wisely by applying these limited funds to the investment projects that seem likely to be the most productive (Frank and Bernanke, 2007). Various funding initiatives have been instituted in the past to improve the access of MSMEs to long term funds in order to improve their performance and contribution to the economy.

To this end, a variety of financial institutions, schemes and funds have evolved over the years. The period, 1964-2000 can be described as the old financing initiatives, while the

period, 2001 to date can be described as the current financing initiatives. Past initiatives to support MSMEs in Nigeria had been very largely focused on bolstering the credit finance opportunities at their disposal. In this paper, specific emphasis was on the effect of DMBs' credit on the performance of MSMEs in Nigeria.

II.2 Review of Empirical Literature

II.2.1 Credit Constraints and Credit Market Imperfections

Credit programmes have long been a favoured intervention by donors and governments in Africa. Implicit in these interventions is a concern that credit markets are not functioning well and that their malfunctioning results in low economic activity and growth. There are well established reasons for credit markets not to be perfect. Given the inter-temporal and risky nature of credit administration, the informational requirement and enforcement problems are large and agency costs affect the outcome. The consequence is that uncollateralised lending will not take place at the prevailing real interest rate. The borrower will be constrained by being forced to borrow money at higher interest rates to cover monitoring and enforcement costs or, as is usually the case, be rationed by not being allowed to borrow at all at these interest rates. In either case, less lending takes place than if there were no monitoring problems. Enforcement problems further reduce credit market transactions (Stiglitz and Weiss, 1981; CBN/CeRAM, 2007).

Bigsten et al., (2003) investigated the question whether or not firms in the manufacturing sector in Africa were credit constrained. They made use of firm-level data from six African countries (Ghana, Zimbabwe, Kenya, Ivory Coast, Burundi and Cameroon) to study both the existence and nature of credit constraints. They applied evidence on credit market participation and on the reasons for non-credit market participation to identify possibly constrained firms. They also investigated whether agency and enforcement costs, or limited demand were the cause of non-participation in credit markets by firms. They attempted to identify whether banks' lending policies are biased against certain firms, beyond monitoring and enforcement problems. Bigsten et al., (2003) indicated that more than half of the firms in the sample had no demand for credit. Of those firms with a demand for credit, only a quarter obtained a formal sector loan. Their analysis suggested further that banks allocate credit on the basis of expected profits. Thus, micro, small and medium sized firms are less likely to be given a loan.

This buttressed the justification for evolution of various specialised financing programmes to increase access of MSMEs to loan in Nigeria by the Federal Government in collabouration with the Central Bank of Nigeria. However, as gleaned from the study and confirmed by Odeniran (2002) and Evbuomwan (2004), evidence of low demand for formal credit was established. To overcome this obstacle, the Federal Government in collabouration with the Bankers' Committee came up with the Small and Medium Enterprises Equity Investment Scheme (SMEEIS), where Nigerian banks were requested to set aside 10.0 per cent of their profit after tax for equity investments in SMEs.

An earlier work by Abereijo and Fayomi (2005) on Small and Medium Industries Equity Investment Scheme (SMIEIS) (renamed SMEEIS in 2006) alluded to the fact that access to finance was one of the factors inhibiting SMEs growth in Nigeria. The authors agreed that equity had distinct advantages over debt for the development of SMEs. They concluded, however, that in Nigeria, equity financing was still an unknown fiscal concept, both by the entrepreneurs and financial institutions, and the market was still poorly developed. Given the dearth of experience in venture capital investing, it was important that the government, through the CBN, considered the establishment of a formal programme for the training of fund management professionals to augment the experience required by the eligibility criteria for the equity financing. This was required to change the mindset of the bankers and to acquire more skills which was quite different from their usual ways of loan appraisal.

A study by Rahji and Ajani (2007) found profit and equity provision to negatively affect the demand for funds under SMEEIS, while enterprise type, net-worth, gender and ownership were positive significant variables, explaining the demand for funds under the scheme. The equity provision condition was identified by the authors as a major problem in the operation of the scheme. The authors therefore called for an overhaul of the scheme.

Similarly, a study on supply and demand for finance of small enterprises in Ghana by Aryeetey et al., (1994), indicated that, smaller firms in Ghana are not particularly receptive to external participation in their operations. A little over half (56.0 per cent) of the total sample indicated a preference for debt to equity finance, a third preferred equity finance to debt finance. Medium-sized enterprises were the most likely to accept equity finance; only 18.0 per cent would refuse an equity partner to help finance an expansion. Newer firms tended to be more receptive to equity

participation in their firms than older ones. Among firms with fewer than thirty employees, however, 40.0 per cent would regard a local equity partner as undesirable even if they could not obtain a large enough loan for their expansion projects. Many expressed the view that they "cannot trust partners who would only put a little bit of money into an enterprise and want to control it". Nevertheless, SMEs in Ghana were more receptive to an equity finance arrangement if it came from an institution that did not seek to control the daily operation of the establishment. Many entrepreneurs expressed a desire to have foreign firms or institutions participate in their enterprises, on the presumption that foreign participants would be better able to provide adequate investment capital than local co-investors, while leaving their Ghanaian partners to run the business.

II.2.2 Effect of Credit and Credit Support Programmes on Growth of MSMEs

The use of bank credit can affect firm growth positively if credit allows a firm to address its liquidity constraint, thereby increasing profitability and growth. This is why governments and donor agencies have funded credit expansion programmes, particularly, targeting the disadvantaged sectors of the economy like agriculture and MSMEs. Some empirical evidences on how credit uses have affected the growth of MSMEs in Nigeria and elsewhere are discussed below.

Tella (1998) investigated the level of involvement of commercial banks in rural activities in Nigeria. The paper measured in terms of the bank's provision of loans and advances for agricultural activities (being the dominant occupation) in the rural sector. The essence of the investigation was to determine the justification of the Central Bank of Nigeria in downplaying the rural banking scheme in favour of community banking then, which he believed, cannot be a replacement for the commercial banks, given the latter's huge assets and banking experience. The study was carried out using an econometric method of analysis to determine the relationship between loans and output in the agricultural sector and its sub-sectors. The overall results showed that the loans had a positive impact on all the sectors except fisheries. Based on the result, he proposed a reinforcement of the rural banking scheme and selective transformation and restructuring of commercial banks to practice universal banking.

Nkurunziza (2005) carried out an empirical study on the effect of initial size and access to credit on Kenyan firms' rate of growth. He used various estimation methods, namely; Ordinary Least Square (OLS), Non-linear Least Square (NLS), Instrumental Variable (IV), Fixed Effects (FE), Generalised Method of Moments (GMM), and Heckman's Selection

Model. The results showed that the use of credit increased surviving firm managers' claim that access to credit is one of the main problems they face. Furthermore, the author found evidence that small firms have higher rates of growth (or lower rates of decline) than large ones.

Salvatore and Marco (2006), investigated whether Italy's State-funded guarantee scheme for SMEs (SGS) was an effective means to overcome the main difficulties faced by small firms in accessing the bank credit market. This meant assessing whether SGS was able to increase credit access for SMEs, reduce credit cost and achieve financial sustainability. Results of their econometric tests provided evidence that the fund's guarantee raised the amount of credit SMEs received from the banking system, and lowered the SMEs borrowing cost to a substantial extent. Furthermore, it limited defaults covered by the guarantee to a very low percentage and mobilised a significant amount of bank loans to the advantage of SMEs by leveraging a relatively small amount of public financial resource.

Raji (2000) studied equity participation, productivity and loan default factors in externally funded agro and non-agro allied enterprises in Nigeria. The study analysed equity participation, productivity and loan default factors among entrepreneurs benefiting from improved production technology in the agro and non-agro allied sub-sectors of the Nigerian economy. The main objective was to provide empirical evidence on the productivity gains inherent in the use of external loan capital and human resources, given the equity funding level of the beneficiaries. Major analytical tools employed included the capital-labour intensity model which was used to analyse the effect of technological advancement on labour productivity. The production relationship between output and the independent variables, namely: equity contribution, loan, wages and cost of raw materials was captured with the Cobb Douglas production function, while the multivariate discriminate analysis was employed to identify factors separating defaulters from non-defaulters. The result indicated that domestic resource based industries dominated by agro-allied enterprises showed relatively higher utilisation rates at 42.0 per cent compared with 39.0 per cent recorded by industries with high import content. The growth rates of capital-labour ratio (an index of labour productivity) showed that the labour productivity increased annually by 39.9 per cent in the agro-allied sector compared with 32.5 per cent in the non-agro-allied sector from 1983 to 1997. On the other hand, the value added-labour ratio revealed an annual growth rate of 37.6 per cent for the agro-allied sector as against 26.2 per cent for the non-agro-allied sector in the same period. The Cobb-Douglas production function analysis revealed that the equity fund

and quantity of labour available to the enterprises were found to have significantly influenced the value added in each enterprise. Hence, the equity funding level was the most critical factor influencing the productivity of the different enterprises. The factors discriminating defaulters from non-defaulters of externally funded enterprises in order of economic importance were loan experience, value of product, product type, income from sources apart from production, and number of supervision times.

Akinyosoye (2006) analysed the relationship between plant size and factor productivity in agro-allied industries in Nigeria and the nature and efficiency of their production process using production frontiers analytical techniques. The outcome of the technical efficiency analysis showed that small to medium sized firms were more technically efficient than the large firms. The overall result of the study pointed to the fact that government needed to encourage more rural based SMEs, especially food processing firms, in order to generate more employment in the country. In this vein, the emphasis will have to be placed on improving basic infrastructure (roads and electricity) and access to the international market as well as introducing friendly tax regimes and credit markets for SMEs. This study further confirms the importance of access to credit by SMEs.

II.2.3 Financial Sector Development and Economic Growth in Nigeria

Adebiyi (2004) empirically investigated the impact of interest rates and other macroeconomic factors on manufacturing performance in Nigeria using vector autoregression and an error correction mechanism (ECM) technique with quarterly time series spanning 1986:1 to 2002:4. Unit root test and Johansen cointegration tests were performed. Result of the error correction model revealed that real deposit rate had a positive impact on the growth of the manufacturing sub-sector while the impact of inflation rate in the second quarter was negative. He therefore recommended that government must create an enabling environment to promote savings and pursue institutional reforms that encourage savings mobilisation. He also recommended that the CBN adopt a number of measures to lower interest rate such as giving government deposits to banks that offer lower rates to the manufacturers and lend to the real sector of the economy. He cited the case in the United States of America, where the Community Reinvestment Act (CRA), provided for targeted lending (to underdeveloped communities), that Nigerian Government could adopt similar measures to promote lending to the manufacturing sub-sector.

Ukeje and Akpan (2007) carried out an empirical investigation of the relationship between financial development and economic growth in Nigeria. They specified a

model with the annual growth rate of the gross domestic product as the dependent variable and the independent variables were; real interest rate, ratio of gross domestic savings to GDP, the ratio of domestic credit to private sector to GDP (which have been widely used as prime indicators of financial development). The other variables adopted include; the ratio of liquidity liabilities to GDP, the ratio of gross fixed capital formation to GDP and trade openness as a ratio of GDP. The empirical results showed that there is substantial positive relationship between financial development and economic growth in Nigeria. The ratio of credit to the private sector to GDP was said to be significant and rightly signed.

Finally, Akpokodje (1998) explored the association between private investment and macroeconomic policies (including fiscal policy, exchange rate policy, monetary policy, etc.) with particular reference to Nigeria. His results confirmed that macroeconomic policy variables do actually affect private investment in Nigeria. Government's monetary policy, as gauged by credit to the private sector was said to have strong positive and significant impact on private investment. Furthermore, the paper confirmed the negative impact of real exchange rates and high domestic inflation rates on private investment in Nigeria and highlighted the adverse impact of large budget deficits on private capital accumulation. He, however, cautioned that in view of the complementarity between private and public investment, reducing the budget deficit through contraction in public investment may be counterproductive.

III. Methodology

III.1 Scope of the Study This paper focused on the commercial banks' loans and advances to the agricultural and manufacturing sub-sectors of the Nigerian economy between 1970 and 2010 and therefore covers the MSMEs being the most dominant in the country's real sector (CBN/FOS/ NISER, 2001; CBN/NISER, 2004; SMEDAN, 2007).

III.2 Type and Sources of Data

Secondary data that spanned 1970 to 2010, sourced from the National Bureau of Statistics and the Central Bank of Nigeria were used for the study. The secondary data collected include; total gross domestic product, agricultural gross domestic product, other manufacturing gross domestic product, total credit to the economy by commercial banks, credit to the agricultural sector, credit to the manufacturing sector, total deposits and savings with commercial banks, prime lending rate, inflation rate, nominal effective exchange rate, manufacturing capacity utilisation rate, index of electricity consumption, GDP per capita, employment rate, life expectancy at birth, adult literacy rate and poverty incidence in Nigeria.

III.3 Analytical Techniques

A combination of analytical tools was employed in order to achieve the objective of the paper. These include descriptive statistics including measures of central tendency and dispersion, proportional analysis, growth rate and trends. These were used to examine the trend in DMBs' financing of MSMEs in Nigeria. The evaluation of the effect of credit on the performance of MSMEs was carried out with a regression analysis (employing vector autoregression and error correction mechanism (ECM) techniques).

III.4 The Model

In this paper, the ECM technique was employed to capture the long-run and short-run dynamics of the MSMEs' contribution to economic growth in Nigeria. This was in line with studies by Adebiyi, 2004; Rasheed, 2005; Onwioduokit, 2007; and Ukeje and Akpan, 2007; and several others. There are different indicators to measure the performance of the real sector of the economy where the MSMEs are very dominant as in Nigeria (Tella, 1998 and Adebiyi, 2004). As indicated by Adebiyi (2004), the various measures of the performance of the manufacturing sub-sector included: index of manufacturing production, contribution of manufacturing to gross domestic product, employment in the manufacturing sub-sector, capacity utilisation in the manufacturing sub-sector and value-added. Hence, this study takes the contributions of agriculture and other manufacturing to the gross national product as the dependent variable because changes in performance of the MSMEs arising from government policies can be easily observed. The explanatory variables include; commercial banks' credit to agriculture and manufacturing, average capacity utilisation rates, total savings with the commercial banks, prime lending rate, index of electricity consumption, inflation rate, and the nominal effective exchange rate. The multivariate model is specified in the log form in line with the Cobb-Douglas production function, except for prime lending and inflation rates, as follows:

$$\ln GAM = \beta_0 + \beta_1 \ln CAM + \beta_2 \ln TSV - \beta_3 PLR - \beta_4 IR + \beta_5 \ln IEC + \beta_6 InMCU - \beta_7 InNER + \varepsilon_t$$

Where,

lnGAM	=	log of the aggregate of agricultural gross domestic product (AGDP) and other manufacturing GDP
lnCAM	=	log of credit to agriculture and manufacturing
lnTSV	=	log of total savings with the commercial banks
PLR	=	Prime lending rates of DMBs

IR = Inflation rate in the economy
ln IEC = log of the index of electricity consumption
lnMCU = log of manufacturing capacity utilisation
lnNER = log of the nominal effective exchange rate in Nigeria

The *apriori* expectations of the explanatory variables are as expressed below:

$$\beta_1 > 0; \beta_2 > 0; \beta_3 < 0; \beta_4 < 0; \beta_5 > 0; \beta_6 > 0; \beta_7 < 0$$

As in the Cobb-Douglas production function, the βs are the parameters. The value of the β is the elasticity which tells us the magnitude by which the changes in the respective independent variable affects the dependent variable (Mordi, 1992).

III.5 Unit Root Test

Before estimating the equation, it was useful to determine the order of integration of the variables considered (Asteriou and Hall, 2007). In using time-series data, it was a requirement that the time-series properties of such data be assessed since there was a possibility of obtaining spurious results. In doing this, test for stationarity using the Augmented Dickey-Fuller (ADF) test statistic was conducted.

III.6 Cointegration Test

Cointegration analysis helps clarify the long-run relationships between integrated variables (Johansen and Juselius, 1990). Cointegration theory has it that if two data series are non-stationary, the residuals from their linear combination, namely their long-run cointegration regression are likely to be stationary, in which case such a relationship (between the two series), can most appropriately be characterised, or more formally, be represented or specified by an error correction model. The error correction model includes the first lag of the residuals from the long-run cointegrating regression as explanatory variable in the regression model, the coefficient of which is referred to as the ECM, and which necessarily must carry a negative sign, which further lends credence to the assumed cointegrating relationship between the series.

The Johansen's cointegration test was employed to establish the long-run relationship between the integrated variables. This was because the technique is VAR-based and performs better than single equation methods (Rasheed, 2005). The ECM is therefore

characterised by both differenced and long-run equilibrium models, thereby allowing for the estimates of short-run dynamics as well as long-run equilibrium adjustments process. The estimation was conducted using econometric computer software package, EViews 7.0.

IV. Results and Discussion

IV.1 Examination of Trend in Deposit Money Banks' Credit to MSMEs in Nigeria

An examination of Table 2 indicated that from 1970 to 2009, total deposit liabilities of the DMBs in Nigeria averaged ₦882.1 billion, while total credit to the Nigerian economy averaged ₦837.0 billion. This meant that banks gave out 94.9 per cent of the total deposits mobilised as credit for productive activities in the Nigerian economy in the period under review. However, the Table also revealed that demand deposits constituted almost half of the banks' total deposit liabilities from which loans were granted to the economy (as time deposits constituted 56.6 per cent of total deposit liabilities), and these had implications for tenure of these loans.

Table 2: Commercial Banks Selected Performance Indicators
(Averages, 1970-2009, in ₦' Million)

Total Credit to the Economy(A)	Demand Deposits	Time, Savings and Foreign Currency Deposits(B)	Total Deposit Liabilities (C)	B as a proportion of C	A as a proportion of C
836,995.45	382,923.58	499,172.44	882,096.02	56.59%	94.89%

Further analysis of commercial banks loans and advances revealed that credit to agriculture and manufacturing sectors combined grew from ₦83.4 million in 1970 to ₦1,129,158.30 million in 2009 and averaged ₦149,106.08 million per annum. Similarly, total commercial banks loans and advances to the whole economy grew from ₦351.5million in 1970 to ₦9,667,876.70million in 2009, averaging ₦836,995.45million per annum. Consequently, commercial banks loans and advances to agriculture and manufacturing constituted 17.81 per cent of total commercial banks loans and advances to the Nigerian economy on the average between 1970 and 2009(Table 3).

Table 3: Commercial Banks Loans and Advances to Agriculture and Manufacturing as Proportion of Loans to the Economy

Year	Average loans & Advances to Agric. & Manufacturing(A)	Average Total Loans to the Economy(B)	A as a Proportion of B
1970-2009	₦149,106.08m	₦836,995.45m	17.81per cent

IV.2 Trend Analysis of Selected Macroeconomic Indicators

A trend analysis of selected macroeconomic indicators was undertaken in comparison to commercial banks' lending to the MSMEs from 1970 to 2009 in Nigeria (Table 4). From table 4, it can be seen that though credit to MSMEs as well as MSME gross domestic product grew during the period, capacity utilisation declined before assuming an upward trend. Similarly, prime lending rate and inflation rate trended upwards and later moderated. Index of electricity consumption had a mixed trend but improved significantly to 172.7 from 2001to 2009, compared with 92.9 during the period 1989 to 2000. The increase in credit to MSMEs as well as the improvement in the index of electricity consumption and inflation rate could be said to be responsible for the improvement in capacity utilisation.

Table 4: Trend in Commercial banks' credit to MSMEs and Selected Macroeconomic Variables

Year	Credit to MSMEs by Commercial Banks (₦' million)	MSMEs Gross Domestic Product (₦ ' million)	Capacity Utilisation Rate (Per cent)	Prime Lending Rate (Per cent)	Index of Electricity Consumption	Inflation Rate (Per Cent)
1970-77	350.35	5,448.18	77.57	6.63	33.46	15.29
1978-88	4,368.86	28,355.11	54.91	10.57	105.84	17.19
1989-2000	74,983.87	601,234.43	35.59	21.04	92.85	29.52
2001-2009	557,064.06	5,538,384.34	53.46	18.74	172.71	12.92

IV.3 Trend in Socio-Economic Indicators in Nigeria

A trend analysis was also carried out on socio-economic indicators in Nigeria from 2000 to 2010 for which consistent data were available. An analysis of the socio-economic indicators revealed that per capita income in Naira have been growing, from ₦ 39,851.5 in 2000 to ₦185,759.5 in 2010. Similarly, adult literacy rate has improved from 57.0 per cent in 2000 to 66.9 per cent in 2010. The incidence of poverty which was reported to have declined from 70.0 per cent in 2000 to 54.0 per cent in 2009 by the Central Bank of Nigeria, have been reported by the World Bank to have declined once again to 68.0 per cent in 2010. However, life expectancy at birth has remained stagnant at 54 years, while unemployment rate has been on the increase, from 11.9 per cent in 2005 to 21.1 per cent in 2010 (Table 5).

Table 5: Trend in Socio-Economic Indicators

Years	GDP per Capita(₦)	GDP per Capita(US $)	Life Expectancy at Birth(Yrs)	Adult Literacy Rate(Per cent)	Unemployment Rate(Per cent)	Incidence of Poverty
2000	39,851.5	388.1	54	57	n.a	70
2001	59,388.0	530.7	54	57	n.a	n.a
2002	65,232.2	839.1	54	57	n.a	n.a
2003	80,320.1	620.9	54	57	n.a	n.a
2004	89,866	673.2	54	62	n.a	54.4
2005	109,155.1	826.31	54	63.1	11.9	54.4
2006	132,604.3	1,030.34	54	57.2	12.3	54
2007	144,474.5	1,223.49	54	66.9	12.7	54
2008	170,515.0	1,286.29	54	66.9	14.9	54
2009	165,633.9	1,106.77	54	66.9	19.7	54
2010	185,759.5	1,235.92	54	66.9	21.1	68*

Sources: Central Bank of Nigeria Annual Report and Statement of Account, Various issues

*World Bank, 2012.

IV.4 Econometric Investigations

In the attempt to establish the effect of DMBs' credit on the performance of agricultural and non-agricultural MSMEs in Nigeria, a regression analysis was carried out (employing auto-regression and error correction mechanism (ECM) technique) as explained earlier in Sections 3.4 to 3.6. Unit root tests were performed using the Augmented Dickey Fuller (ADF) test. The Johansen's Cointegration Test was also employed to establish the long-run relationship between the integrated variables. The ECM is therefore characterised by both differenced and long-run equilibrium models, thereby allowing for the estimates of short-run dynamics as well as long-run equilibrium adjustments process. The result of this analysis is presented below.

IV.4.1 Unit Root Test Results

Most time series variables are said to be non-stationary and using non-stationary variables in the model might lead to spurious regressions (Asteriou and Hall, 2007). All the variables were tested at levels for stationarity using the Augmented Dickey-Fuller (ADF) test. With the exception of inflation rate and index of electricity consumption which were stationary at levels, I(0), all the other variables were stationary at first difference, I(1). The stationary test results are summarised in Table 6. As shown in table 6, at 5 per cent level of significance, all the other variables were found to be integrated of order 1.

Table 6: Unit root test – Augmented Dickey-Fuller

Variable	ADF		
	Level	1st Difference	Remarks
LGAM	-0.1178	-9.0492**	I(1)
LCAM	-0.5316	-3.7288**	I(1)
LTSV	2.3896	-4.0400**	I(1)
PLR	-2.0619	-8.2573**	I(1)
LIEC	-2.7697*		I(0)
LMCU	-2.0181	-3.4856**	I(1)
IR	-3.8458**		I(0)
LNER	-1.5420	-5.3228**	I(1)

Note: * Significant at 5%
** Significant at 1%

Source: Authors' computation

Table 7: Unit root test of the residual

RES1 residual of the cointegrating variables

Null Hypothesis: RES1 has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.408490	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.
Source: Authors' Computation

The result of the stationary test of the residual from the cointegrating variables is shown in table 7. The result showed that the series individually exhibited random walk as it was stationary at level, I(0) at 1.0 per cent level of significance. There exists a stable long-run relationship among the variables.

IV.4.2 Cointegration test using Johansen-Juselius Technique

The cointegration tests were undertaken based on the Johansen and Juselius (1990) maximum likelihood framework. The essence was to establish whether long-run relationships exist among the variables of interest. The Johansen's technique was chosen not only because it is vector autoregression (VAR) based, but also, because it performs better than the single equation and is alternative multivariate method. This method produces asymptotically optimal estimates since it incorporates a parametric correction for serial correlation. The nature of the estimator means that the estimates are robust to simultaneity bias, and it is robust to departure from normality.

Table 8: Unrestricted Cointegration Rank Test Results

Null Hypothesis	Trace Statistic	Critical value at 5 per cent	Null Hypothesis	Maximum-Eigen statistic	Critical value at 5 per cent
0*	273.9491	169.5991	*0	81.25699	53.18784
1*	192.6921	134.6780	*1	66.92161	47.07897
2*	125.7705	103.8473	2	39.47379	40.95680
3*	86.29668	76.97277	3	31.15427	34.80587
4*	55.14241	54.07904	4	20.56161	28.58808
5	34.58079	35.19275	5	15.11257	22.29962
6	19.46823	20.26184	6	9.815097	15.89210
7*	9.653131	9.164546	7*	9.653131	9.164546

Notes: r represents number of cointegrating vectors. Trace test indicates 5 cointegrating equations at the 0.05 level while max-eigenvalue test indicates 2 cointegrating equations.

*denotes rejection of the hypothesis at the 0.05 level

Source: Authors' Computation

Johansen method detects a number of cointegrating vectors in non-stationary time series. It allows for the hypothesis testing regarding the elements of cointegrating vectors and loading matrix. The cointegrating test include GDP of MSMEs, credit to MSMEs, index of electricity consumption, manufacturing capacity utilisation rate, exchange rate, interest rate and savings. The result is as shown in Table 8. The test statistics strongly reject the null hypothesis of no cointegration in favour of more than one cointegration relationships.

IV.4.3 Error-correction Modelling (ECM)

In order to capture the short-run deviations that might have occurred in estimating the long-run cointegrating equation, a dynamic error-correction model was formulated. The ECM was estimated with respect to the dependent variable, LGAM, using ordinary least squares. Given that the primary objective of the study was to investigate the relationship between contribution of the MSMEs to the GDP and its determinants, the aim of this section was to analyse the parameters of the variables and the error correction term. The error correction term depicted the speed of convergence to equilibrium once the equation was shocked. All the variables (first order differenced) in the equation were stationary and therefore OLS method gave consistent estimates.

The negative sign of the ECM indicated long-run convergence of the model to equilibrium as well as explaining the proportion and the time it took for the disequilibrium to be corrected during each period in order to return the disturbed system to equilibrium.

As is the tradition, the over-parameterised model was reduced to achieve a parsimonious model (Table 9). Parsimony maximised the goodness of fit of the model with a minimum number of explanatory variables. The reduction process was mostly guided by statistical considerations, economic theory and interpretability of the estimates. Thus, the parsimonious reduction process made use of a stepwise regression procedure (through the elimination of those variables and their lags that were not significant), before finally arriving at interpretable model. The parameter estimates along with the standard errors, t-values and the corresponding critical values were also given in Table 9.

By examining the table, it was observed that all the parameter estimates did better in the parsimonious model compared with the over-parameterised model. An important feature to note was the coefficient of the parameter of the error correction term. It carried the correct sign and it was statistically significant at one per cent (Table 9). The significance of the ECM supported cointegration and suggested the existence of long-run steady-state equilibrium between MSMEs contribution to GDP (GAM) and the independent variables. An examination of the overall fit indicated that the parsimonious model (Table 9) had better fit compared with the over-parameterised model, with a higher value for the adjusted R-squared (0.77 compared with 0.63 respectively), and good Durbin-Watson statistic. The Adjusted R^2 of about 0.77 indicated that 77.0 per cent of the variation in GAM was explained by the exogenous variables that entered the parsimonious model. The D-Watson statistics of 1.93 showed the absence of serial correlation in the model

Table 9: Parsimonious model

Dependent Variable: D(LGAM)
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LCAM)	1.056955	0.337220	3.134317	0.0045**
D((LCAM(-2)))	-0.820740	0.358062	-2.292172	0.0310*
D(LIEC)	-1.121139	0.291517	-3.845880	0.0008**
D((LMCU(-1)))	1.109486	0.579925	1.913155	0.0677*
D((LMCU(-2)))	-1.051129	0.563458	-1.865496	0.0744*
D((LGAM(-1)))	0.618194	0.188143	3.285770	0.0031**
D((LGAM(-2)))	0.422303	0.135635	3.113524	0.0047**
RES1(-1)	-1.852348	0.251388	-7.368476	0.0000**

R-squared	0.825043	Mean dependent var	0.094667
Adjusted R-squared	0.774013	S.D. dependent var	0.246108
S.E. of regression	0.116995	Akaike info criterion	-1.241052
Sum squared resid	0.328508	Schwarz criterion	-0.874618
Log likelihood	27.85683	Hannan-Quinn criter.	-1.119589
Durbin-Watson stat	1.930275		

Notes: * Significant at 5%, ** Significant at 1%
Source: Authors' Computation

In line with theory and previous empirical studies (Tella, 1998; Nkurunziza, 2005; and the Urban Institute, 2008), credit had a positive effect on GDP of MSMEs in Nigeria as the coefficient of CAM (credit to MSMEs) was positive (1.06) and significant at one per cent level. Similarly, the coefficient of the first lag of manufacturing capacity utilisation, MCU was positive (1.11) and significant at the five per cent level confirming a positive relationship between GDP of MSMEs and the first lag of manufacturing capacity utilisation. Also the coefficients of the first and second lag of GDP were positively signed (0.62 and 0.42 respectively) and significant at the one per cent level indicating a positive relationship between previous years GDP and current GDP.

Contrary to *apriori* expectation, the coefficient of the index of electricity consumption (IEC) was negative (-1.12) and significant at one per cent. This might not be unconnected with inadequate and epileptic electricity supply in the country as most MSMEs relied on generators to carry out their operations. In fact, a survey conducted by the Manufacturers Association of Nigeria (MAN) between January to May, 2010, revealed that on the average, the Power Holding Company of Nigeria Plc(PHCN) supplied only 7.8 hours per day of total energy required by manufacturers while the latter had to generate the remaining balance of 16.2 hours per day through own electric generators. The implication of this situation according to the MAN survey was that, the much needed capital required in maintaining and increasing production was

locked up in purchasing and fuelling generators. This led to increase in overhead and operating costs (MAN, 2010).

V. Conclusion

This paper set out to assess the effect of DMBs credit on the performance of agricultural and non-agricultural MSMEs in Nigeria. The definition of MSMEs in Nigeria as contained in the national policy on MSMEs in Nigeria was given as well as the importance of MSMEs in the economic growth and development of nations. In addition, the role of credit to the performance of MSMEs in various jurisdictions was presented, as well as the problem of sourcing credit by MSMEs due to their peculiarities. After sourcing secondary data from both the CBN and NBS, descriptive statistics were used to examine the trend in DMBs credit to MSMEs as well as other macroeconomic and socioeconomic indicators in Nigeria. The evaluation of the effect of credit on the performance of MSMEs in Nigeria was carried out with the aid of multivariate analytical technique.

From the analysis, the coefficient of CAM (which was the credit to MSMEs as specified in the model) was positive and significant suggesting that credit had a positive effect on GDP of MSMEs in Nigeria. Similarly, the coefficient of the first lag of MCU was positive and significant. Thus, an increase in the manufacturing capacity utilisation rate would increase the contribution of MSMEs to GDP.

The paper, therefore, recommended that effort should be made to improve access to credit by MSMEs, for the generation of employment as well as creation of wealth to alleviate poverty. Furthermore, all the funding institutions, schemes and funds directed at the MSMEs in Nigeria, such as the Bank of Industry, the Bank of Agriculture, The Agricultural Credit Guarantee Scheme Fund, the Small and Medium Enterprises Credit Guarantee Scheme Fund (SMECGS) which has replaced the SMEEIS, etc., should be sustained, in order to improve the access of MSMEs to credit. The problem of inadequate power supply needed to be urgently tackled as it hampered MSMEs activities. The CBN, the Federal Ministry of Finance and other government agencies should intensify efforts to provide a conducive macroeconomic environment for MSME operations.

As stated by the World Business Council for Sustainable Development (WBCSD), "the key to poverty alleviation is economic growth that is inclusive and reaches the majority of people. Improving the performance and sustainability of local entrepreneurs and micro, small and medium enterprises (MSMEs), which represent the backbone of

global economic activity, can help achieve this type of growth" (WBCSD, 2004). In this vein, the activities of government institutions focused on MSMEs in Nigeria such as the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), as well as those in the organised private sector such as the NASME, LCCI, NASSI, etc. should be encouraged, particularly given the high incidence of unemployment and poverty in Nigeria.

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Analysis of External Debt Dynamics in ECOWAS Economies

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Abstract

This paper recognised the importance of identifying the core determinants of external debt dynamics in ECOWAS economies. Using a panel dynamic generalised least squares procedure, the study sought to identify the core determinants of external debt dynamics in 12 ECOWAS economies from 1970 to 2009. Overall, the findings revealed six core determinants of external debt in ECOWAS economies. Inflation, external reserves, per capita income and real oil prices were inversely related with external debt ratio; while, GDP gap and real effective exchange rate depreciation directly affected external debt. Significant dissimilarities were observed in the influence of government size and inflation within the WAEMU and the WAMZ subsamples, implying that a synchronisation of debt and fiscal policies for the two regions might yield different outcomes. Further, the results suggested that there was a wide deviation in the initial conditions in Guinea-Bissau and Burkina Faso from the other economies in the region.

Keywords: External debt, ECOWAS, panel data analysis

JEL Classification: H63, FO2, F21, C33

I. Introduction

Since the beginning of the global debt crisis in the early 1980s, African countries especially those in West Africa have had a chequered history of unsustainable debt patterns (see Figure 1). This trend has led to serious concerns about fiscal sustainability and their broader economic and political impacts. However, the contemporary issue now relates to the extent to which external debt dynamics are likely to have an adverse effect on the transition to and sustenance of the proposed monetary and currency union in the West African region. This concern is particularly justifiable when considering the evolving sovereign debt crisis facing the Euro zone, especially because the proposed unified monetary and currency union in West Africa is to a great extent modelled after the pattern of the European Monetary Union (EMU). The Economic Community of West African States (ECOWAS) is in the process of a transition towards a monetary union, and has proposed to launch a common currency for the union, with the proposed inception date being 2020. ECOWAS is a

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regional group of 15 West African countries[1] which already includes a monetary union of the former French colonies known as West African Economic and Monetary Union (WAEMU)[2]. In April 2000, ECOWAS adopted a strategy of a two-track approach to the adoption of a common currency in the whole region. As a first track, the non-WAEMU members of ECOWAS were to form a second monetary union known as the West African Monetary Zone (WAMZ)[3]. The second track of the strategy is to merge WAEMU and WAMZ regions into a single monetary union with a single currency.

The feasibility of a wider monetary unification in ECOWAS poses several economic and institutional challenges, some of which have been identified and discussed in detail by Tsangarides and Qureshi (2008) and Masson and Pattillo (2005). However, there is yet the external debt component which has not been systematically examined to identify appropriate policy reactions and prerequisites needed for a smooth and sustainable transition to a monetary union in the region. This paper is in response to this vacuum. Hence, it seeks to empirically identify the core set of country characteristics that determine the behaviour of external debt for the ECOWAS economies. In doing so, a model of debt accumulation is developed and estimated using a panel dynamic generalised least squares (DGLS) approach for 12 ECOWAS economies between 1970 and 2009. The paper also seeks to uncover any similarities or dissimilarities in the nature of the relationship between external debt and country economic characteristics in the WAEMU and the WAMZ zones.

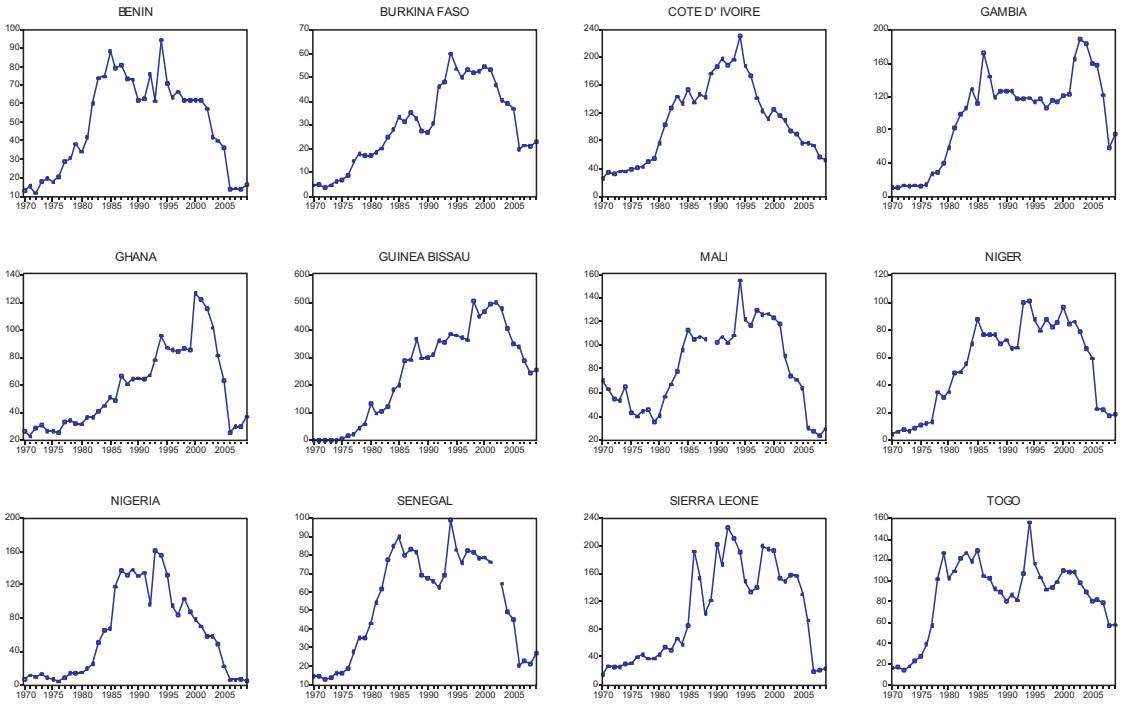
The balance of the paper is structured as follows. Section II provided an overview of the behaviour of external debt of the ECOWAS countries, as well as the factors accounting for this behaviour. Section III reviewed the theoretical and empirical literature. In Section IV, the methodology was described, with the debt accumulation model, data, and *apriori* expectations clearly explained. Section V presented the empirical analysis and discussion of results while Section VI contained the policy implications and conclusion.

II. The Behaviour of External Debt in ECOWAS Economies

The external debt ratio of most ECOWAS economies has been significantly volatile in the last four decades. In the 1970s, all the economies had relatively low external debt ratios, most of them maintaining levels below 10 per cent of GDP. The trend, however, escalated in the 1980s and 90s with most of the economies attaining external debt ratios of over 100 per cent of GDP (see Figure 1). One of the reasons identified for this unsustainable patterns of growth, was the unfavourable terms of trade conditions for mostly primary export commodities of these countries.

1. *The list includes: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.*
2. *Members of WAEMU include Benin, Burkina Faso, Cote d'ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo.*
3. *WAMZ countries include The Gambia, Guinea, Ghana, Nigeria and Sierra Leone.*

Figure 1: External debt/GDP ratio in ECOWAS economies



In the case of Nigeria, Ajayi (1991, 2000) found that the oil glut in the international market and the fall of Nigeria's exports by about 13.0 per cent and increase in import by about 64.0 per cent were responsible. Additionally, spending on 'white elephant' developmental projects was a significant contributor to external debt build-up during the 1980s and 90s. Particularly, these economies engaged in inefficient and suboptimal spending on telecommunications, transport and power infrastructure.

However, in the early years of the millennium, we observed sharp reductions in the external debt ratio for all the economies. This reversal in the trend was mostly due to the joint IMF-World Bank debt relief campaign under the Heavily Indebted Poor Countries (HIPC) initiative launched in 1996 and reinforced in 1999. Almost all the economies in the region have benefited and are still benefiting from this initiative. Recently (in 2010), Guinea-Bissau and Togo got 1.2 and 1.8 billion US dollars debt relieve through this window (IMF, 2011). In addition to this, some of these countries have complemented their efforts to obtain debt relief by entering into bi-lateral negotiations with the Paris Club and other creditors to write-off their debt. One outstanding success story was the

60.0 per cent debt relief obtained by Nigeria from the Paris Club valued at over 20.0 billion US dollars during the same period.

Incidentally, the observations for the most recent two years in our sample (i.e. 2008 and 2009) seemed to suggest that the external debt pattern of these economies had resumed upward direction. This might be as a result of the difficulties that had been faced by most economies due to the global financial crises that started in 2007. However, fiscal restrains might be necessary to ensure that the ratios do not rise to unsustainable patterns again, thereby undermining the processes of the transition and sustenance of a monetary union.

III. Literature Review

External debt dynamics has important ramifications over an economy both in the short- and long run. The conventional argument is that external debt (reflecting deficit financing) can simulate aggregate demand and output in the short-run (assuming no non-Keynesian effects), but crowds out capital and reduces output in the long-run (Kumar and Woo, 2010; Elmendorf and Mankiw, 1999). The question, however, was to identify the factors that led to the build-up of external debt stocks. The most emphasised determinant of external debt dynamics in the literature was income. Solomon et al., (1977) argued that a decrease in output was detrimental to debt servicing and led to a widening gap between savings and investments. Similarly, Craigwell et al., (1988) suggested that authorities might resort to borrowing when real gross domestic product (GDP) unexpectedly falls below its full employment level.

One of the first empirical studies to examine the determinants of external debt was Barro (1979), who reported that losses in output and large government expenditure were significant factors in the growth of the US external public debt since the World War I. In a related study, Greenidge et al., (2010) used a panel dynamic OLS procedure to examine the determinants of external debt in 12 Caribbean Community (CARICOM) economies. The paper found that output gap, real cost of foreign borrowing, real effective exchange rate and exports were inversely related to the level of indebtedness, while the current deviation of government expenditure from its trend was positively associated. Within a panel estimation framework, Forslund et al., (2011) investigated the determinants of the composition of public debt in developing and emerging market economies. After controlling for a large set of country characteristics, they found among other factors that inflation, GDP, level of financial development, current account ratio, exchange rate misalignment and trade

openness had significant influences on domestic debt composition, although some differences were noticed among their sub samples.

For Pacific Island Countries (PIC), Jayaraman and Lau (2009) tried to answer the question; does external debt lead to economic growth in Pacific Island Countries? Their empirical findings indicated that there was a short-run causal linkage running from external debt, budget deficit and exports to output. Therefore, they concluded that external borrowing contributed to growth in the short-run. Consequently, higher growth resulted in further rise in external debt levels. For the Latin American economies, Pastor (1988) conducted a survey and regression based analysis of the internal and external causes of debt accumulation in that region and found that poor fiscal and exchange rate policies as well as external factors, such as reduction in the growth rate of the U.S economy, adverse terms of trade, high interest rates and oil price hikes are the main determinants.

In the sub-Saharan Africa, Ajayi and Khan (2000) argued that the build-up of external debt in the region had been mainly due to excessive government size and expenditure. Other regional and country specific studies for Africa, like Iyoha (2000), Ajayi (1991, 1995, and 2000) and Barungi and Atingi (2000), all identified factors like worsening terms of trade, access or lack of access to petrodollars, high interest rates, variability in export revenue and the real effective exchange rate as the chief variables impacting on the regions high foreign indebtedness. Political factors had also been identified as major determinants of external debt dynamics. Craigwell et al., (1988) observed that government in some countries engaged in excessive spending prior to an election to gain the favour of the electorate. Also, misalignments in government incentives might exacerbate external debt levels. Along these lines, Alesina and Tabellini (1988) argued that a government in power knew that when its term was over, a new government would be responsible for the debt previously incurred. Hence, it did not fully internalise the cost of borrowing and would as a result tend to over borrow (Greenidge et al. 2010).

IV. Methodology

IV.1 Model and Estimation Procedure

To identify the factors that determine external debt dynamics in the ECOWAS economies, dynamic generalised least squares (DGLS) approach was used to examine the impact of external debt on a set of country characteristics within a panel data framework. The external debt function is presented:

$$ED_{it} = \alpha_{it} + x'_{it}\beta_i + \varepsilon_{it} \quad (1)$$

and x'_{it} is a vector of country specific characteristics denoted as: $[INF_{it}, GSZ_{it}, CAR_{it}, EXCH_{it}, EXRE_{it}, OGAP_{it}, GDPPC_{it}, MS_{it}, OPN_{it}, FDIN_{it},, INT_{it}, ROP_{it}]$ with the *i* subscripts representing the *i*th country and *t* the time period for the respective variables. β_i represented the regression coefficients and the *i* subscript implied that the coefficients were the same for all the economies. ε_{it} was the error term, and it was assumed to be independently and identically distributed with zero mean and constant variance. The vector of variables x'_{it} contained a set of country characteristics which were assumed ex-ante to be determinants of external debt dynamics in the ECOWAS economies.

The set of country characteristics in x'_{it} were classified into four categories to determine external debt dynamics in the ECOWAS economies. These were: macroeconomic variables; country size and level of development variables; openness variables and external shock variables. The first category included inflation (*INF*), government size (*GSZ*), current account ratio (*CAR*), real effective exchange rate (*EXCH*) and external reserves (*EXRE*). The second category was real GDP gap (*OGAP*), GDP per capita (*GDPPC*) and level of financial development (*M2/GDP*). Variables that measured the openness of the economies included trade to GDP ratio (OPN) and foreign direct investment inflows (*FDIN*). Finally, measures of external shocks were real global interest rate (*INT*) and oil prices (*ROP*).

Equation 1 was estimated using both the random and fixed effects model as well as the Hausman test to judge the reliability of the estimate. The differences across the groups of countries were tested by splitting the sample into WAEMU and WAMZ regions. The estimation proceeded in three steps. First, a battery of panel unit root tests was applied to the data in other to determine their levels of integration. The unit root tests undertaken in the paper was for confirmatory evidence. Some of the tests undertaken included that by Levin et al., (2002) and Breitung (2002) which had a common unit root process as null hypothesis. Other unit root tests employed included the Im et al., (2003) test, ADF Fisher Chi-square test (Dickey and Fuller, 1979) and Phillips-Perron (PP) Fisher Chi-square (Phillips and Perron, 1988).

Second, tests for the existence of cointegration in equation 1 were conducted. Two statistics for the existence of cointegrating relationships among the variables were employed. One was Pedroni (2004), who developed several within dimension and between dimension tests which had no cointegration as their null hypothesis and the other is that by Kao and Chiang (2000).

Third, the Dynamic Generalised Least Squares (DGLS) method proposed by Kao and Chiang (2000) was utilised, primarily because this methodology allowed for the derivation of estimates among variables of different orders of integration. This method involved augmenting equation 1 with lags of the first difference of the variables, which were *I*(1) stationary. This augmentation corrected for endogeneity and possible autocorrelation. The paper also used the lags of all other variables to ensure that the explanatory variables were predetermined. The augmentation was:

$$ED_{it} = \alpha_{it} + x'_{it}\beta_i + \sum_{j=1}^{K} \lambda_j \Delta x^{I(1)}_{it-j} + \xi_{it} \qquad (2)$$

Where $x^{I(1)}$ denoted the subset of *I*(1) variables in the set $[x']$of country characteristics. *K* was the order of the lag length, λ_i was the vector of long-run coefficients, while the introduction of $\Delta x^{I(1)}_{it-j}$ accounted for possible endogeneity of the explanatory variables (Forslund et al., 2001; Greenidge et al., 2010; Muhanji and Ojah, 2011).

IV.2 Data and Theoretical Expectations

The data sources, description and construction for all the variables as well as their theoretical expectations are explained as follows. The following components (public, publicly guaranteed, private nonguaranteed long-term debt, use of IMF credit, and short-term debt) as a ratio of GDP were used to measure of external debt. The series were retrieved from the World Development Indicators (WDI) database. Within the sub-set of country characteristics representing macroeconomic variables, inflation (*INF*) was a main measure of macroeconomic instability and it was retrieved from the IMF International Financial Statistics (IFS-CD ROM, 2010). A positive relationship between inflation and external debt ratio was expected. The reason was because a government with a history of high inflation might need to obtain more foreign currency debt in order to credibly signal its commitment to pursuing a strong and stable monetary policy (Calvo, 1988). There were also exceptional mechanism like the valuation effect (Forslund et al. 2011) which might lead to a negative correlation between inflation and external debt.

Government size (*GSZ*) proxied by a ratio of government expenditure to GDP was used to measure the level of government involvement in the economy. It was expected to be positive since increase in government total expenditure was usually financed with external debt. The current account balance as a ratio of GDP (*CAR*) was expected to have a negative coefficient, simply because countries running current account surpluses need not borrow from abroad. Whereas countries with

deficits need to borrow in other to balance off. Real effective exchange rates (*EXCH*) were obtained from IMF-IFS and its theoretical relationship with external debt was ambiguous. A real depreciation of the domestic currency would lead to the reduction of the stock of external debt provided there was a subsequent increase in export earnings substantial enough to enable the government to service its external debts (Greenidge et al. 2010). Otherwise, the increase in *EXCH* would result in a rise in external indebtedness. External reserves (*EXRE*) were expected to have a negative relationship with external debt ratio because countries with higher reserves are more likely to deplete their reserves before opting for debt.

Variables measuring country size and level of development were obtained from WDI. Real GDP gap (*OGAP*) measured as the deviation in the trend of real GDP was modeled using the Hodrick and Prescott (1997) filter. The coefficient of this variable was expected to be positively signed as countries were likely to resort to borrowing when output was low or below expected levels. A similar argument for the relationship held for per capita GDP (*GDPPC*) and size of the financial system (*M2/GDP*). There were no clear expectations about the relationship between external debt ratio and the two measures of openness (trade and financial). With respect to trade openness (*OPN*), more open economies might suffer less from balance sheet effects associated with external borrowing (Calvo, 2003) and a negative relationship between trade openness and external debt ratio was expected. Financial openness measured by FDI inflows as a ratio of GDP (*FDIN*), had the tendency to foster demand for external borrowing, thereby promoting a positive relationship between financial openness and external borrowing (Reinhert et al., 2011).

The effects of external shocks on external debt were uncertain and depended on the structure of the economy in question. For an oil-exporting economy like Nigeria, an external shock in terms of increases in global oil prices was likely to affect the external debt ratio inversely, while the same relationship might not be expected in non-oil exporting economies in the ECOWAS. The impact of the real cost of foreign borrowing (*INT*) measured by the long-term interest rate of US bonds was uncertain. A rise in the interest rate could slow down the accumulation of external debt by discouraging borrowing, or it could increase the stock of debts when loans were contracted at variable rates (Greenidge et al., 2010). This variable was retrieved from the Statistical Bulletin of the National Bureau of Economic Research (NBER).

V. Results and discussion

V.1 Panel unit root, cointegration and effect specification tests

In Table 1, the results for six types of panel unit root test conducted were presented. The

Table 1: Panel Unit Root Test Results

Variable	LLC	Breitung	IPS	ADFFC	PPFC	Hadri
ED	-0.87 (0.19)	3.49 (0.99)	0.13 (0.55)	16.88 (0.85)	16.7 (0.86)	8.02 (0.00)***
∆ED	-7.01 (0.00)***	-8.65 (0.00)***	-8.20(0.00)***	113.8(0.00)***	248.9(0.00)***	4.08(0.00)***
INF	0.44(0.67)	-3.21(0.00)***	-4.33(0.00)***	73.89(0.00)***	134.43(0.00)***	6.01(0.00)***
GSZ	-2.91(0.00)***	-2.91(0.00)***	-3.44(0.00)***	52.81(0.00)***	74.88(0.00)***	5.83(0.00)***
CAR	-2.14(0.01)**	-5.05(0.00)***	-3.22(0.00)***	61.65(0.00)***	87.89(0.00)***	7.67(0.00)***
EXCH	2.09(0.98)	0.21(0.58)	3.61(0.99)	8.08(0.99)	9.61(0.99)	11.55(0.00)***
?EXCH	-7.08(0.00)***	-10.08(0.00)***	-9.22(0.00)***	129.49(0.00)***	248.8(0.00)***	9.65(0.00)***
EXRE	1.39(0.91)	2.11(0.98)	2.21(0.98)	26.21(0.34)	21.52(0.61)	2.58(0.00)***
?EXRE	-5.77(0.00)***	-5.83(0.00)***	-8.92(0.00)***	130.9(0.00)***	237.6(0.00)***	2.07(0.01)**
LOGAP	3.02(0.99)	-1.61(0.05)*	6.29(1.00)	5.22(1.00)	6.93(0.99)	13.31(0.00)***
?*LOGAP*	-6.99(0.00)***	-8.87(0.00)***	-11.19(0.00)***	165.1(0.00)***	273.5(0.00)***	1.22(0.11)
*L*GDPPC	0.62(0.73)	1.04(0.85)	1.44(0.92)	25.24(0.39)	31.86(0.13)	8.19(0.00)***
?*L*GDPPC	-6.96(0.00)***	-3.42(0.00)	-10.01(0.00)***	140.2(0.00)***	200.35(0.00)***	3.44(0.00)***
M2GDP	1.16(0.87)	-4.38(0.00)***	0.81(0.79)	20.32(0.67)	18.30(0.78)	6.27(0.00)***
?M2GDP	-8.27(0.00)***	10.64(0.00)***	-9.77(0.00)***	141.4(0.00)***	190.83(0.00)***	0.03(0.48)
OPN	-2.10(0.01)**	-0.77(0.21)	-2.42(0.00)***	40.07(0.02)**	48.01(0.00)***	7.19(0.00)***
FDIN	0.57(0.71)	-3.98(0.00)***	-1.46(0.07)*	47.12(0.00)***	92.74(0.00)***	5.34(0.00)***
INT	-1.97(0.02)**	-1.79(0.03)**	-3.00(0.00)***	47.10(0.00)***	72.53(0.00)***	5.52(0.00)***
*L*ROP	-1.97(0.02)**	0.7(0.75)	0.44(0.67)	26.05(0.35)	33.81(0.08)*	5.68(0.00)***
?*L*ROP	-6.77(0.00)***	5.5(0.00)***	-7.83(0.00)***	113.3(0.00)***	249.3(0.00)***	1.91(0.02)**

Keys: LLC- Levin, Lin and Chu test; Breitung t-stat; IPS- Im, Pesaran and Shin W-stat; ADFFC-Augmented Dickey Fuller Fisher Chi-square test; PPFC-Philips and Perron Fisher Chi-square test. *, ** and *** represents 10, 5 and 1% levels of significance.

overall analysis from the panel unit root test results indicated that 7 of the 13 variables were *I*(1) stationary, while the other 6 variables were stationary at levels. Since the variables had different orders of integration, the Pedroni (1999) statistics was used to determine the existence of unique cointegration relationship among the variables. The results for the cointegration test were reported in Table 2.

Two categories of tests for the existence of cointegrating relationships were conducted. The first had to do with within-dimension statistics and the second was between-dimension statistics. The two categories of test were conducted with different test specifications, including: with no intercept and no trend; with intercept and no trend; and with intercept and trend. Overall conclusion from the analysis presented in Table 2 below indicated that there was at least one cointegrating relationship.

Table 2 : Pedroni panel cointegration test results

	Within dimension (panel statistics)			Between dimension (group statistics)		
Specification	No intercept no trend	Intercept no trend	Intercept and trend	No intercept no trend	Intercept no trend	Intercept and trend
v	10.12(0.00)***	-2.56(0.01)**	-2.29(0.00)***			
rho	2.59(0.01)**	2.82(0.00)***	4.85(0.00)***	3.26(0.00)***	3.42(0.00)***	3.72(0.00)***
PP	-16.61(0.00)***	3.13(0.00)***	5.65(0.00)***	0.31(0.50)	-6.21(0.00)***	0.67(0.24)
ADF	- 7.84(0.00)***	-2.05(0.04)**	5.54(0.00)***	- 0.35(0.38)	-3.41(0.00)***	0.34(0.37)

Note: the test statistics are reported above along with their probability values. *, ** and *** represents 10%, 5% and 1% levels of significance, respectively.

Since the variables showed varying levels of integration, it would be appropriate to determine the long-run relationship by using the DGLS method proposed by Kao and Chiang (2000). However, it was important to determine the appropriate panel regression specification to use, whether it was the fixed effects model (FEM) or the random effect model (REM). The Hausman test was applied to determine which should be the appropriate model. The null hypothesis underlying the Hausman test was that the FEM and REM do not differ substantially (Gujarati and Porter, 2009). If the null hypothesis was rejected, the conclusion was that the REM was not appropriate because the random effects were probably correlated with one or more regressors. In this case, FEM would be preferred to REM.

The test reported an asymptotic Chi-square statistic (with eight degrees of freedom) of 23.33 with a 0.00 probability. Hence, the Hausman test clearly rejected the null hypothesis. As a result, the REM is rejected in favour of the FEM.

V.2 Discussion of Fixed effects

To ensure robustness and in order to obtain confirmatory evidence, the estimation of the FEM was carried out with two alternative specifications: cross section fixed effect specification only, and cross section and period dummy fixed effect specification. The estimation was done for all ECOWAS economies, and then with sub-samples of WAEMU and WAMZ economies. Table 3 contained the result of the estimation with the cross section fixed effect specification.

Focusing on the first category of country characteristics i.e., macroeconomic imbalances, it was discover that inflation had a negative coefficient in the total ECOWAS and WAEMU sub-samples, hence the hypothesis that governments with a history of high inflation might need to obtain more foreign currency debt to credibly signal its commitment to pursuing a strong and stable monetary policy might not be generally valid for the ECOWAS economies. This might be an indication of the existence and operation of the valuation effect in the region. The relationship for the WAMZ sub-sample was however different. This relationship contrasts with what had been discovered by Forslund et al., (2011) and Burger and Warnock (2006) in other developed and developing economies. One possible explanation could be because the WAEMU economies already had a union and a common monetary policy, hence there was cap on these economies potential to borrow uncontrollably given that they do not have monetary autonomy.

Table 3: Cross Section Fixed Effect Specification

	(1)	(2)	(3)	(4)	(5)	(6)
	All ECOWAS		WAEMU		WAMZ	
Variable	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
INF_{t-1}	-0.363*	0.201	-0.333*	0.189	0.221	0.189
GSZ_{t-1}	0.296	0.490	-0.710	0.448	2.694***	0.810
CAR_{t-1}	-0.001	0.483	0.538	0.433	-0.673	0.424
$?EXCH_{t-1}$	0.024***	0.009	0.013	0.010	0.004	0.010
$?EXRE_{t-1}$	-0.228***	0.029	-0.629***	0.112	-0.182***	0.037
$?LOGAP_{t-1}$	4.096***	1.165	-19.748***	4.165	1.216	5.49
$?LGDPPC_{t-1}$	-5.339*	3.214	-21.018***	4.200	-1.488	5.60
$?M2GDP_{t-1}$	-0.855	0.478	-0.138	0.548	-1.419**	0.538
OPN_{t-1}	0.009	0.155	-0.477**	0.204	-0.035	0.179
$FDIN_{t-1}$	0.473	0.876	-1.861	1.589	0.737	0.876
INT_{t-1}	-0.154	0.237	-0.339	0.257	0.667	0.518
$?LROP_{t-1}$	0.004***	0.002	-0.002	0.002	0.007***	0.001
Constant	69.816	51.091	175.877***	51.609	-192.38**	90.334
R2		0.84		0.92		0.71
S.E of Reg.		268578.9		25.75206		30.169
No. of Obs.		289		193		96
N. Countries		12		8		4

Where *, ** and *** represents the 10%, 5% and 1% levels of significance respectively. Weighting: cross section standard errors.

As expected, there was a positive relationship between government size and external debt stock. This relationship was particularly significant for the WAMZ region but negative in the WAEMU economies. The implication was that increases in government size led to external debt accumulation to finance this debt especially in the WAMZ region. The overall implication for the ECOWAS economies implied that a one per cent increase in the size of government expenditure, would lead to an average of 0.3 per cent increase in external debt stock to GDP ratio. The coefficient of current account ratio was negatively signed as expected, indicating that countries with current account surpluses did not need to borrow abroad.

The positive and statistically significant coefficient of exchange rate indicated that a rise in real effective exchange rate (depreciation) was generally associated with increases in external debt ratio for the ECOWAS economies. This was an indicator of a

relatively weak export base (primary products) of these economies was unable to meet the increased commodity demands associated with a depreciation, and hence, it was unable to generate earnings that were large enough to offset the losses from depreciation. Our results were similar to the results found by Forslund et al., (2011) for low-income countries and different from the results of Greenidge et al., (2010) for CARICOM economies. The coefficient for external reserves had the expected negative sign and it was statistically significant in all sub-samples. This result was in line with the expected thinking that countries with higher reserves tended to deplete their reserves first before opting for debt.

The set of country characteristics, which had to do with country size and level of development, showed that as GDP gap increases, external debt ratio also increase. This result supported Barro's hypothesis that negative deviations from the optimal level of GDP allowed for faster levels of debt accumulation and it also confirmed Solomon's (1977) thesis that deviations below the optimal level of output widened the gap between domestic savings and desired investment. The relationship was, however, different for the WAEMU economies given the negative and statistically significant parameters obtained.

The other two indicators of level of development - GDP per capita and *M2GDP* - had negative relationships, suggesting that productively and financially developed economies experienced low accumulation of external debt. For the full sample, openness had a positive relationship with external debt ratio. However, for the WAEMU and the WAMZ sub-samples, the relationship was negative, but significant for the WAEMU sub-sample. The relationship between external debt ratio and financial openness (*FDIN*) was positive but not statistically significant.

The results for the last category of characteristics showed that there was an inverse relationship between the real cost of foreign borrowing and the external debt ratio of the ECOWAS economies. That meant that when real interest rates rose, the accumulation of external debt slowed. The results were, however, not statistically significant. The ECOWAS economies were significantly affected by external shocks emanating from changes in real oil prices. The positively observed relationship implied that increase in real oil prices led to increased foreign borrowing to satisfy local demand of petroleum products. Even though this relationship was statistically significant for the total sample and the WAMZ region, the results for the WAEMU region indicated a statistically insignificant negative relationship.

Table 4 Cross section and period dummy fixed effect specification

	(1)	(2)	(3)	(4)	(5)	(6)
	All ECOWAS		WAEMU		WAMZ	
Variable	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
INF_{t-1}	-0.205	0.228	-0.116	0.194	0.670***	0.161
GSZ_{t-1}	0.642	0.562	-0.032	0.378	1.540*	0.778
CAR_{t-1}	-0.053	0.464	-0.845**	0.377	-1.064***	0.376
$?EXCH_{t-1}$	0.031**	0.013	0.330***	0.046	-0.015	0.009
$?EXRE_{t-1}$	-0.085**	0.034	-0.056	0.124	-0.010	0.055
$?LOGAP_{t-1}$	4.581*	2.621	-13.023***	3.364	9.478*	5.522
$?LGDPPC_{t-1}$	-5.712**	2.646	-13.970***	3.416	8.812	5.615
$?M2GDP_{t-1}$	0.696	0.539	-0.517	0.477	0.426	0.943
OPN_{t-1}	0.150	0.153	0.118	0.200	-0.100	0.184
$FDIN_{t-1}$	1.219	1.061	-1.231	1.315	0.644	0.843
INT_{t-1}	-0.307	0.248	-0.011	0.233	-0.637	0.498
$?LROP_{t-1}$	0.002	0.002	-0.002	0.002	0.005**	0.002
Constant	-14.445	55.322	-117.088**	53.070	-65.211	85.688
R2		0.89		0.96		0.90
S.E of Reg.		27.1865		19.7192		21.464
No. of Obs.		289		193		96
N. Countries		12		8		4

Where *, ** and *** represents the 10%, 5% and 1% levels of significance. Weighting: cross section standard errors.

Table 4 showed the results for the estimation of the same set of equations as in Table 3 that included cross section and period fixed effects. While the estimates in Table 3 could be interpreted as jointly capturing within-country and within-period differences, the estimates in Table 4 accounted for within-country differences. Thus, the estimates in Table 4 should be interpreted as an indication of whether within-country differences in country characteristics were associated with within-country changes in external debt ratio. The two variations of fixed effect specifications yielded similar results especially as it pertained to the signs and magnitudes of the parameters estimates. The main difference, however, was that a fewer number of variables were statistically significant in the period dummy fixed effect specification.

V.3 WAEMU vs. WAMZ

Given the very wide differences in the history and economic configuration of the WAEMU and the WAMZ economies, significant differences were observed in the pattern of relationship between external debt dynamics and country characteristics in the two regions. First, the impacts of inflation on external debt dynamics in the two regions were different. While there was an inverse and statistically significant relationship for the WAEMU subset, the relationship for the WAMZ region was equally positive. This might be an indication that while the WAMZ economies might prefer to signal their commitment to pursue a strong and stable monetary policy by contracting foreign debt, the WAEMU economies had a fiscal monetary policy imposed by virtue of the discipline associated with the existing *de facto* union.

Another difference in regional characteristics that was worthy of note was the impact of government expenditure/size on external debt dynamics. Tables 3 and 4, showed a direct and statistically significant relationship between government size and external debt ratio in the WAMZ economies, while it was negative and insignificant in the WAEMU region. The implication of this result in the transition to a monetary union was that more stringent fiscal rules and discipline would need to be enacted and enforced for the WAMZ economies. Also, synchronisation of debt and fiscal policies in the two regions were unlikely to yield similar results. These regional idiosyncracies would need to be factored in to ensure that the ECOWAS wide monetary union would be sustainable and free from debt crises.

Table 5 Country Specific Effects

	Cross section fixed effect specification			Cross section and period dummy fixed effect specification		
	ECOWAS	WAEMU	WAMZ	ECOWAS	WAEMU	WAMZ
Benin	-41.45	-47.36		-58.32	-61.98	
Burkina Faso	-72.73	-65.28		-70.50	-80.58	
Cote D' Ivoire	27.80	11.07		20.35	13.33	
Gambia	38.47		35.36	12.50		49.03
Ghana	-34.40		-61.66	-32.60		-63.22
Guinea Bissau	275.43	312.95		246.31	306.18	
Mali	-12.72	-2.95		-23.43	-24.50	
Niger	-51.83	-55.72		-44.91	-60.31	
Nigeria	-7.02		-5.33	-13.59		-23.71
Senegal	-35.01	-40.31		-51.60	-57.27	
Sierra Leone	35.36		43.89	29.79		37.90
Togo	-9.33	8.32		-14.00	-34.87	

Another interesting point to note was the impact of global oil prices on the external debt dynamics of these regions. While the relationship for the WAMZ economies was direct and statistically significant, for the WAEMU economies, it was inverse and not statistically significant. Again, these differences required special policy considerations before the two regions could be successfully merged into one monetary union.

Retrieving the country specific effects for the two variants of fixed effect estimations carried out, Table 5 presented the variation of country-specific intercepts from the mean value. These values provided insight on the initial conditions and economic structures of these economies across board in the region. By concentrating on the left segment of Table 5 which contained the country specific effects for the cross section fixed effect specification, it was observed that the initial conditions or country characteristics of two economies: Guinea-Bissau and Burkina Faso were significantly different. This was inferred from their intercept variation of 275.4 and -72.7, respectively. Among the WAMZ economies, Ghana seemed to have a widely different economic condition from other countries. These factors were likely to increase the challenges towards a successful transition to a monetary union in the region.

VI. Policy Implications and Conclusion

This paper recognised the importance of identifying the core determinants of external debt dynamics in the transition to and sustenance of the proposed ECOWAS monetary and currency union. Using a panel DGLS procedure, the study sought to identify the core determinants of external debt dynamics in 12 ECOWAS economies between 1970 and 2009. Overall, the findings revealed that there were six core determinants of external debt dynamics in ECOWAS economies. Inflation, external reserves, per capita income and oil prices had inverse relationship with external debt ratio, while GDP gap and real effective exchange rate depreciation had direct relationship.

When the sample of the two existing unions, the WAEMU and the WAMZ, were split, the paper observed significant differences in the pattern of relationship between external debt dynamics and country characteristics in the two regions. One of such differences was the impact of inflation on external debt. While the observed relationship in the full ECOWAS sample and the WAEMU sub-sample was inverted, the relationship for the WAMZ region was positive. This implied that the valuation effect of inflation might be pervasive in the WAEMU economies but not in the WAMZ economies. Policy reforms would be required in the WAMZ economies to avoid the use of foreign currency debt to signal commitment to strong and stable monetary policy.

Further, there was a strong direct relationship between government size and external debt dynamics in the WAMZ region unlike the full ECOWAS and the WAEMU samples. This was an indication of the expansionary fiscal policy pattern prevalent in the WAMZ economies, which led to rapid increase in the external debt burdens of these economies, implying that a synchronisation of fiscal policies for the two regions might yield different outcomes for external debt sustenance. Although development was a priority and spending for developmental purposes was equally important. The need for fiscal reforms was particularly pertinent in the WAMZ economies to ensure that external debt stocks did not soar to unsustainable levels. The investigation of country-specific effects revealed that the initial conditions in two of the ECOWAS economies; Guinea Bissau and Burkina Faso were radically different from other economies.

The overall policy recommendation was that efforts should be intensified to improve the performance of productive sectors in other to reduce external indebtedness. Higher outputs would narrow the gap between domestic savings and desired investment and therefore, minimise the need for external borrowing and by extension, reduce the subsequent rate of growth of external debt. Again, raising production levels would allow for greater export growth and less importations. This could generate and save foreign exchange earnings to support debt servicing.

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